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AMERICAN JOURNAL OF OPHTHALMOLOGY

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A METHOD OF PREVENTING LOSS OF VITREOUS.

F. FRISCH, M. D.

ATLANTIC CITY, N. J.

By previously placing a suture, with a knot on it, the corneal incision can be instantly and completely closed to meet any emergency that may arise during operation.

In order to have a suture prevent or aid in stopping already escaping vitreous, it is necessary to be able to act instantaneously. As a rule it takes too long to pick up two ends of a thread, when vitreous is threatening to escape.

For ten years I have studied the various sutures devised for cataract operations, and tried many of them myself, with and without modifications, on animal and human eyes. Several methods answer the purpose very well after operation is completed, when no necessity exists for closing the gaping wound rapidly. The suture described here has been developed after hundreds of experiments on animal eyes, and since then its efficiency has been proved in a number of cataract operations on the human eye, when loss of vitreous seemed imminent. Kalt says: "Once the suture is tied, one is master of the situation." With the suture described here, one is master of the situation, even before tying it. When the wound is gaping or vitreous already escaping, it is only necessary to pull on the long end of the thread and hold it until patient stops squeezing or the situation is otherwise controlled. Even the speculum may be removed safely or the lids closed.

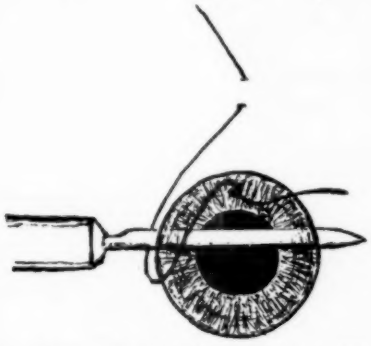

Fig. 1. Suture applied before making incision for cataract operation, drawn aside to be out of the way of the knife, which has been introduced, making the puncture and counter puncture.

To prepare the suture, white silk spool thread, size B and 25 cm. long, is passed thru the eye of the smallest curved needle which will take that size thread. The usual short self threading needles answer the purpose very well. A loop like a single bow knot is tied 10 cm. from one end and drawn out so that a loop remains only 1 mm. long. This loop, or knot, will prevent the thread from slipping thru a hole made in the cornea by the needle. A loop can be eliminated after the operation by pulling on both ends of the thread, but there is no harm in tying the suture right over the loop if it does not pull out readily.

The needle is inserted into the cornea 1.5 mm. to the temporal side and 2.5 mm. below the upper corneal margin, emerging about 1.2 mm. above insertion, without entering the anterior chamber, and the thread pulled thru until the knot is in contact with the cornea. This suture can be placed lower if the operator prefers to have the incision terminate high in the cornea. Now the needle is inserted into the conjunctiva 4 mm. above the limbus, emerging 1.5 mm. above. With a strabismus hook the thread between the corneal and conjunctival insertions is pulled up to form a loop 12 to 15 mm. long so that the thread can not obstruct the escaping cataract. The

operator is now ready for the incision. The end of the thread which has passed thru the conjunctiva is longer, i. e., farther away from the knot than the other shorter end, which should be laid out of the way across the nose, and not touched until ready to tie the suture after the operation.

At any time during the operation, if necessary to do so, the wound can be closed rapidly by simply pulling in any direction on one end, i. e., the long end of the thread. The wound can be held closed until the patient gets thru squeezing or the situation is otherwise under control, and the toilet of the wound completed after the suture is tied. The speculum may be removed, the lids closed or opened, the iris replaced, and if the capsule has been opened, the remaining debris may be scooped out or removed by irrigation. In dislocated lenses, the loop, or Reisinger hooks, may be introduced and the wound held closed until the escaping lens shuts off the escaping vitreous, and after the lens is out the wound can be immediately closed again by simply pulling on one end of the thread. If the operation has progressed without incident, and the operator is ready to tie the suture, the knot can be eliminated by pulling on short end of the thread also, or it can be pulled away from cornea. But no harm results from leaving the knot in contact with cornea, and tying the suture right over it, on account of the elastic pull of the conjunctiva.

Four years ago I operated on 18 cataracts with thru and thru corneal sutures, i. e., both sutures passing thru the whole thickness of cornea, which I generally removed on the fourth day. Then I had two particularly unruly patients who squeezed so that I left the sutures in eight days, and in each case a severe iridocyclitis developed. This suggested that an ideal suture should be tolerated at least a week without detrimental results, and that it should be elastic. The suture described here has frequently been left in 10 to 20 days without reaction, or until it cuts thru the conjunctiva or cornea, and there is no reason for removing it for at least a week. When one or both eyes are left open protected by a wire mask, the suture generally cuts thru about the fourth day. Scissors are so easily slipped under it, that it is not necessary to mention the suture to the patient until after it is out.

Summary: Instantaneous control of gaping wound of escaping vitreous.

No possible escape of vitreous after the cataract is out, even before suture has been tied.

When necessary to resort to loop or spoon, the wound can be held firmly closed until the escaping cataract closes wound, and again immediately after it is out. This is best accomplished by an assistant holding the long end of the thread in one hand and controlling the size of loop with a small strabismus hook in the other hand. While holding the wound closed by pulling on the long end of the thread, the other end is picked up, and the suture tied.

This procedure does not prolong the operation because the suture can be inserted while waiting for anesthesia of the iris.

PROFESSOR BARRAQUER OF BARCELONA AND HIS METHOD OF PHAKOERISIS.

JOHN O. MCREYNOLDS, M.Sc., M.D., L.L.D., F.A.C.S.

DALLAS, TEXAS.

This paper gives a sketch of Prof. Barraquer and the conditions under which he has developed his operation, which is likely to be of great interest in connection with the Washington Congress. It also gives interesting details with regard to the technic, and estimates of importance by the writer and by Col. Smith.

"Barraquer's method of intracapsular extraction has come to stay" was the terse verdict of Lt. Col. Henry Smith after he had made a visit to Barcelona. And after his own wonderful experience with fifty thousand intracapsular operations according to a method which he has developed and found efficient, this statement carried a tremendous weight of authority, and rather impelled me to undertake a journey of ten thousand miles to see at first hand the salient details of this important procedure, which was first described in the English language about one year ago.

Fig. 1. Hospital at Barcelona, Spain, in which the work of Professor Ignacio Barraquer has been done.

It is refreshing to observe the generous spirit entertained for each other by these two great exponents of rival methods of intracapsular cataract operations. They both have concentrated their talents on the same object, the complete removal of the lens in its unbroken capsule, one solely by expression and the other entirely by traction.

It is not my purpose at this time to enter into a discussion of the relative merits of the two procedures. This I may do at a future period, when I shall have accumulated sufficient data upon which to base a just and comprehensive analysis. When properly understood and properly applied, they both contribute immensely to our resources in dealing with the most interesting surgical problem in Ophthalmology. For the present I shall be content to give some of the outstanding features of the Barraquer method, and the conditions under which his investigations have been developed, because the latter have an important bearing upon the former.

It is remarkable that the three men, whose labors in practical ophthalmic surgery have attracted perhaps the most widespread interest in the last quarter of a century, have been men who have in a sense been similarly situated. They have all been located in cities out of the beaten paths of ophthalmic pilgrimages; Lt. Col. Henry Smith of Jullundur in the Punjab, Lt. Col. Robt. Henry Elliot in Madras, and Prof. Ignacio Barraquer in Barcelona. Their environments were similar in the respect that they commanded a large area comprising many millions of people, that they were practically supreme in authority in their respective domains, and had a free hand to develop procedures unhampered by constant contact with the influences of precedent and revered traditions.

It is proper here to point out the special advantages that have surrounded Barraquer. He lives in the commercial metropolis of old Spain, and thither come the blind not only from the millions in Spain, but from her far flung colonies in South America and the Islands of the Southern Seas. His father, Jose Barraquer, still alive and active, for forty years has been a patient, scientific and progressive ophthalmologist in this capital of the Catalunans. His myriad of pathologic and histologic specimens have been prepared and preserved with an accuracy and system hardly surpassed in any part of the world. The methods of diagnosis and study have brought into requisition the most complete array of scientific apparatus that could be found, and thus every opportunity was provided in advance for the younger Barraquer that improved facilities or inspiring example could offer.

Coupled with these should not be omitted the direct personal interest and stimulation that an intelligent and ambitious better half could bring. It is no wonder, then, that a mind naturally acute, and a physical constitution sensitive to the delicate variations of success and failure, should have embarked upon the sea of investigation with an unusual spirit of enthusiasm and patient endeavor. There is a certain sentiment of adventure in the Spanish temperament that did not die out when Isabella Queen of Spain was the only one in all the world who was willing and able to lend the necessary aid to Columbus, that resulted in giving to mankind the western hemisphere with its long train of epoch making conquests in the new world.

In this somewhat isolated realm, Ignacio Barraquer took up the work of his distinguished sire, and has built upon this foundation a structure of such finished design and careful execution that it must endure. Of course there

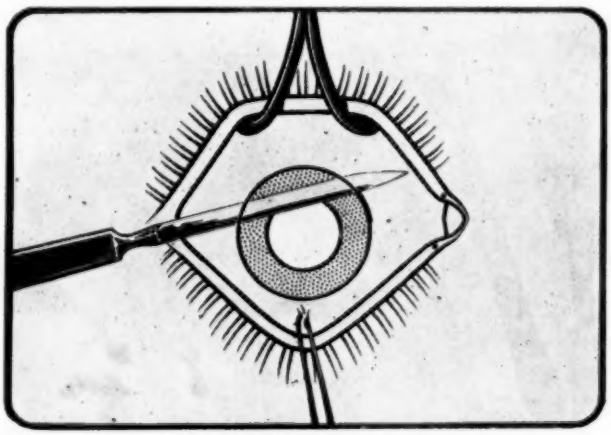

Fig. 2. Making the corneal incision. Point of knife elevated to make nasal end of incision first.

is nothing distinctly original in the conception. The Pagenstechers, Hulen, and many other ophthalmologists have recognized the merits of the objective sought, but the peculiar opportunities of Barraquer and his persistent and sustained efforts have contributed in an unusual degree to the final result.

His procedures begin with a rather exhaustive study of each individual case, omitting no feature of a complete examination, and providing against every reasonable contingency by a careful preparation of the patient, the surgeon and everything that comes in contact with the operative field.

The various sources of autoinfection are investigated and if possible removed. The eye to be operated is tested practically by the application of a bandage for twenty-four hours, to develop any individual tendency on the part of the patient or the eye to interfere with a successful termination. Any morbid process or pathologic bacterial invasion receives special attention before any operation is made, and only one eye at a time is operated on account of the possibility of an unsuspected expulsive hemorrhage, or other disaster that might be averted in the case of the second eye, should this become imminent from the experience with the first one. If the case shows any pathogenic bacteria after this initial test, it is treated with free irrigation with bichlorid of mercury solution 1 to 3000 (followed with frequent irrigations with normal salt solution) and the application of silver nitrat to the lid margins only, until it is established that the eye is practically free from the danger of infection from the tissues themselves.

The immediate preparation of the eye consists in the instillation of drops composed of cocain, euphthalmin, and adrenalin at intervals during a period of two hours. This procedure he feels secures a deeper anesthesia, a greater safeguard against annoying hemorrhage and a wide dilatation of the pupil, which, however, after the completion of the operation permits the action of eserin to become effective in contracting the pupil. The face is adequately covered with sterilized towels, and the conjunctival sac again thoroly irrigated with normal salt solution, after the folds of the superior retrotarsal conjunctiva have been smoothed out by everting the tarsus with appropriate forceps. All instruments, solutions and dressings are sterilized by heat in the usual way. The hands of the operator and assistant are cleansed with soap and water, then immersed in bichlorid solution and then in alcohol, and then dried with a sterile towel. The surgeon and assistant wear white cotton gloves, and

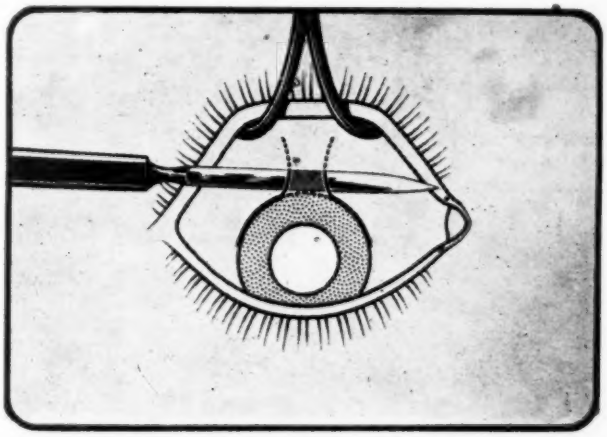

Fig. 3. Incision complete in corneoscleral junction. Knife cutting conjunctival flap.

a mask of white cotton cloth covers the head and face with the exception of the eyes. The assistant, standing to the right of the patient, with one thumb firmly depresses the lower lid, thus controlling the inferior fibers of the orbicularis, and also elevates the upper lid with a Desmarre's retractor, while exerting some upward pressure on the brow with the other thumb, thus completing the control of the orbicularis palpebrarum.

ing a superior conjunctival flap sometimes small and sometimes rather large. Then with de Wecker's pince ciseaux, he elevates the conjunctival flap and reflects it over the cornea so as to get a good view of the iris, which is now caught with delicate forceps gently but firmly near its ciliary attachment. This little piece of iris tissue is cautiously lifted up and excised with the scissors at hand, leaving the sphincter untouched if possible, so as

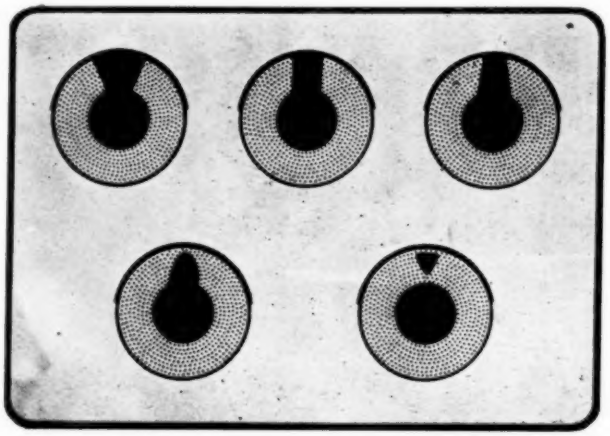

Fig. 4. Different forms of iridectomy. Upper row removal of complete segment of iris of various sizes. Lower row division of sphincter (left) buttonhole outside of sphincter (right).

Immediately preceding the operation, the surgeon makes three injections of a solution of novocain, 1/2 of 1%, into the tissues of the exterior and lower areas surrounding the eye, in such a way as to temporarily paralyze the filaments of the facial nerve supplying the orbicularis. This effect varies somewhat with different patients, but usually results in a condition which not only prevents spasm, but barely permits the gentle voluntary closure of the lids, and this continues for about thirty minutes.

The surgeon standing back of the patient at his head, using his left hand, grasps with forceps the tissues just below the limbus while with his right hand he makes his incision with an ordinary Graefe knife, making his puncture and counter puncture in the limbus, and completing his section upward following the limbus, and provid-

to make a button hole peripheral iridectomy. This, of course, is sometimes difficult to execute exactly as desired, especially unless the patient is under good control. The scope of the corneal incision is intended to comprise something less than a semicircumference, approximately the upper 2/5 of the cornea. The fixation forceps now release the globe, and the patient is directed to look straight forward and then a little downwards, but never strongly downwards as is sometimes done. He clearly illustrates how a strong downward movement causes the corneal wound to gape, with the consequent danger of loss of vitreous.

The surgeon with his left hand now takes hold of the Desmarre's retractor controlling the upper lid, and with his right hand introduces the suction cup thru the corneal wound obliquely, at an angle of 45° with the vertical meridian.

The cup is carried downwards and forwards to the area of the dilated pupil, and then gently insinuated a little further down underneath the lower margin of the sphincter of the iris. Then with a very gentle movement the cup is made to rest accurately upon the anterior surface of the lens, without exerting any pressure which might produce a premature dislocation of the lens with vitreous loss. Not until he is sure of the accurate application of the suction cup to the surface of the lens, should the button be pressed to turn on the current with the resulting traction on the lens. If suction is exerted before accurate adjustment is made something besides the lens may be drawn within the cup, namely, the iris or the vitreous. It is extremely necessary that the vacuum produced shall be proper in quantity and in quality, otherwise the capsule may be ruptured, the lens may be dislocated improperly and vitreous lost.

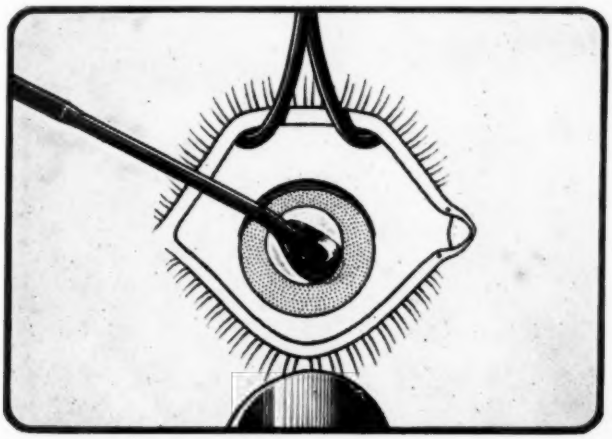

Fig. 5. Cup introduced in anterior chamber and pushed through the pupil so that its margin is behind the edge of the iris. It should be well in this position before any attempt is made to seize the lens by suction.

Barraquer maintains that it is essential that one should use an adjustable vacuum to which can be communicated vibrations corresponding in frequency and amplitude with the elasticity of the crystalline lens. Using Barraquer's exact words, "We must try that our vacuum be isochronally vibrating with the vibrations peculiar to the elasticity of the cataract, not only in order not to break the capsule, but also in order that the contact may be more intimate." The vacuum intensity varies from 55 to 65 c.m. of mercury. In no case is it wise to fish around in an eye with a vacuum canula in the hope of catching the lens, because one may catch too many other things first. If the lens should be dislocated prematurely, either from failure of the instrument to function properly or from some altered state of the interior of the globe, it is best to do as I have seen Barraquer do under such circumstances, make a spoon delivery according to the method of Col. Smith or some other similar method.

There are two distinct ways of delivering the lens after it has been securely grasped by the suction cup. If an ordinary complete upward iridectomy has been made the method of election is to slightly advance the position of the cup so as to put on the stretch and then rupture the superior fibers of the zonule, and then gently tilting forwards the superior margin of the lens so as to clear the upper lip of the corneal wound, slowly withdraw the instrument in an upward direction so as to deliver the lens with its superior edge first.

If, however, a simple extraction is attempted, or a button hole iridectomy has been made, the lens should be de-

livered with its inferior margin first. In other words it should be made to tumble thru an arc of 180° around the transverse diameter of the lens. This is accomplished simply by rotating the canula and cup with the attached lens in such a way, that the inferior margin of the lens breaks away from its moorings, and advances forward from behind the lower segment of the iris into the anterior chamber against the posterior surface of the cornea, and on out thru the corneal opening. Then the remaining fibers of the zonule are readily broken in this process of rotation of the lens. In any case the iris should be carefully adjusted in its proper position after the delivery of the lens.

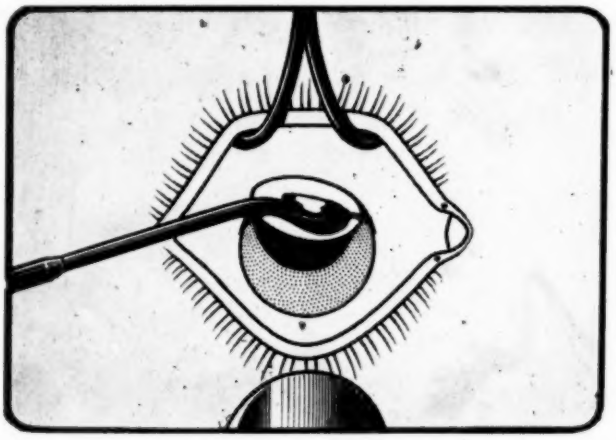

Fig. 6. Method of delivering the lens by turning forward its upper edge after complete upward iridectomy.

Barraquer feels that the simple extraction is followed too frequently by iris prolapse, and that a complete iridectomy involving the sphincter not only takes away the important function of the iris in the regulation of the entrance of light, but also predisposes to a secondary glaucoma, from incarceration in the corneal wound of fibers of the zonule or the iris, and moreover impairs the efficiency of miotics in combating glaucomatous manifestations. So he prefers when possible a peripheral button hole iridectomy. In making his corneal incision, he uses his right hand for the right eye and the left hand for the left eye, but always the right hand for manipulating the cup bearer.

In addition to the details of the procedure as outlined by Barraquer himself, there are certain features that have been impressed upon me as a result of my limited observations of this method in the hands of Barraquer, and also from my own brief experience with the erisiphake in different varieties of cataract. It must be clearly understood that it is not applicable to all kinds of cataract, but only for uncomplicated senile cataract, generally in patients above 50 years of age. It is especially contraindicated in the cases of dislocated lenses and in cases of posterior synechiae. It is applicable in Morgagnian cataract and in immature cataract not associated with vitreous or uveal lesions. It would be a prudent provision to have at hand an extra instrument in case the delicate mechanism should become temporarily impaired.

But the feature that should be most positively emphasized is that success requires not only a reasonable familiarity with this particular method, but an extensive experience with the entire subject of cataract. In fact, it must be admitted that while intracapsular removal of the lens is the ideal result to be achieved, all forms of this operation are more difficult and demand greater dexterity than the regular capsulot-

omy method. It would be very hazardous indeed to undertake any kind of intracapsular operation without being prepared to deal promptly and effectively with any variety of complication that might unexpectedly develop.

It is not the purpose of the writer to present an analytical review of the Barraquer operation at this time, but in the interest of fair judgment and the welfare of patients that may be operated according to this method, it might not be out of place to suggest a few facts that may help to govern an undue enthusiasm with its possible resultant reaction.

1. It must be remembered that the instrumentation in this operation is largely within the eye instead of exterior to it, and that the toleration of traumatism is accordingly very much reduced. The exterior of the cornea, if kept moist, will stand an immense amount of rubbing with a perfectly smooth instrument, as is shown sometimes in the Smith operation, but the delicate endothelium upon the membrane of Descemet if only slightly disturbed may lead to important corneal changes.

2. Each time the suction cup is introduced within the anterior chamber there is an added hazard of injuring the endothelium and of introducing infection.

3. If the suction is in progress and the cup is in the anterior chamber but is not grasping the lens, there is danger, by virtue of the negative tension thus induced, of drawing into the anterior chamber foreign material from the surrounding area which could not improve the prospect for the final result.

The above figures represent the successive steps in the technic of Barraquer's operation for intracapsular extraction of cataracts. Figure 7 shows the position of operator and assistant with the operative costumes worn.

Fig. 7. General position of surgeon, assistant and apparatus during extraction of the lens by suction.

ADDENDUM

In a recent issue of the British Journal of Ophthalmology, Lt. Col. Henry Smith of London has made some observations on the Barraquer method of cataract extraction that are of such value, that I feel impelled to call attention to them in this brief review of the subject. He says, in part:

"I had the pleasure of seeing Dr. Barraquer operate in his own clinic at Barcelona in the spring of this year. . . .

"The principle of his instrument, raising a vacuum to a given tension

and maintaining it at that tension without exceeding it, is perfect.

"A Bunsen pump will do the same thing and will do it nearly as well. The great weakness of the instrument is that the valve is in the hand piece. This necessitates bringing the muscles of the forearm strongly into action, and maintaining that action in keeping the valve closed. This causes the operator to have a stiff wrist, and to use the muscles of the forearm in performing the operation, whereas not a single muscle of his forearm should ever be used in a cataract operation. The muscles of the hand, alone, should be used if we wish to have the necessary lightness of touch and dexterity. The valve should be foot controlled, not hand controlled. . . .

"The chief thing which stimulates me to write this article is that I have heard complaints of an undue number of cases of detachment of the retina after the use of this instrument. I am very anxious to assist anyone who is trying to extract cataract in the capsule by any method. If it is realized that the mechanics of this operation and of the one I have worked out are exactly the same, and the knowledge properly applied, then we will hear less of such trouble as detachment of the retina.

"In my method we put pressure on the lower third of the lens thru the cornea, and continue that pressure thruout at right angles to the anterior surface of the lens as it emerges. This causes the lens to swing round on its transverse axis. The suspensory ligament is thus ruptured first opposite the middle of the wound. The Barraquer instrument should grip the front of the lens and then be rolled between the fingers so as to do exactly the same thing. As used by some operators when it gets its grip it is made simply to lift forward the lens. By this means a temporary vacuum is produced behind the lens, which ipso facto lifts forward the vitreous body, and hence dislocation of the retina or even the choroid. When, however, it is made to roll on its transverse axis so as to rupture the suspensory ligament at the wound first, the air passes behind the lens and no such vacuum lifting the whole contents of the eye forward comes into action. This is the essential point to keep in mind when using this instrument."

VACUUM EXTRACTION OF CATARACTS.

CLYDE ELLIOTT McDANNALD, M.D.

NEW YORK CITY.

Certain modifications in the instruments for securing a vacuum in the Barraquer suction extraction of cataract are here suggested. The method of controlling this vacuum is believed to be more simple and efficient than that of Barraquer.

The intracapsular extraction of cataracts became a matter of extraordinary interest to me last fall, after reading Dr. Ignacio Barraquer's article on this subject which appeared in the October issue of the "American Journal of Ophthalmology," where, under the title "Phakoerisis," he described a method of procedure quite new in many respects. In the December, 1910, issue of the "Ophthalmic Record," Dr. Vard Hulen of San Francisco reported a new operation for extraction of cataract in its capsule by what he termed the "Vacuum Method." It, however, remained for Doctor Barraquer to revivify this process and develop a dependable technic.

After making a careful study of Doctor Barraquer's instrument from the halftone cuts that were employed by him to illustrate his operation, I concluded that a simpler device could be substituted. With this thought in mind, I visited a jeweler and laid before him Doctor Barraquer's article with my own suggestions as to the

modifications of the instrument described.

The instrument employed by me consists of a hollow metal handle to which is attached a tapered silver canula three cm. long, the smallest outside diameter of which equals one and one-half mm. One cm. from the end the canula is bent at an angle of approximately ten degrees; the end is flared out, and in this broadened end is fashioned an oval suction cup, two and one-half mm. in width by three mm. in length and one-half mm. in depth. The entire instrument is twelve cm. long.

Fig. 1. McDannald's suction instrument for vacuum extraction of cataract.

Four cm. from the end of the suction tip, a four mm. opening is made in the large tube or handle. This hole is situated where the index finger can easily be slipped over it for the purpose of making and breaking the suction, in this way eliminating the valvular mechanism referred to by Doctor Barraquer as being necessary for the proper manipulation of his instrument. The handle of the instrument is inserted into the open end of a rubber connection tube which is attached to a rarefication pump. (I use a No. 50 Sorensen pump.) When the finger is placed over the opening in the handle, it acts perfectly as a valve, thereby making it possible to control the suction at will without stopping the pump. The amount of vacuum is regulated by the interposition of a vacuum control gauge, which should be set at from ten to fifteen pounds, according to the assumed density of the lens.

Since designing this instrument, I have operated successfully upon a number of cases of cataract with it. The technic employed is my own. In the use of the instrument the first problem for consideration is the selection of cases. My experience leads me to the conclusion that intracapsular extraction should be limited to certain types of cataracts. For instance, the hard, sclerosed lenses have proved the easiest to remove. Next, the hypermature lenses, in which the capsule has become somewhat thickened, stand this method very well. In the mature senile type, where the capsule is very brittle, the suction cup often will lift out a section, resulting in capsulotomy. Sometimes in such cases I have reapplied the instrument and had it adhere sufficiently strongly to the nucleus to enable its removal. It is better, however, to discontinue the vacuum and deliver by expression. Patients sixty or more years of age lend themselves best to this procedure, as the zonular fibers are more easily ruptured after this period of life.

When possible, I perform a preliminary iridectomy but often do the combined operation. So far I have attempted no simple extraction. The preparation of the patient is the same as in any other method.

The section should embrace one-half of the cornea and, if possible, preserve a conjunctival flap. Where it is difficult to make a full size section, the Stevens scissors are employed to enlarge the wound. The speculum is then removed and an iridectomy performed when making a combined operation. If there is a slight bleeding into the anterior chamber, the blood should be removed by irrigating with saline solution.

The instrument is introduced by gently lifting the corneal flap and passing the cup of the vacuum extractor down over the anterior surface of the lens to a point a little below its equator, where it is placed lightly in contact with the anterior lens capsule. The latter is very quickly picked up

when the index finger is slipped over the opening in the handle of the instrument. The instrument is then moved from side to side and up and down without backward pressure being exerted at any time until the lens is loosened in its *patellar fossa*. Then by a lifting movement, it is caused to emerge from underneath the upper scleral border, and is gently withdrawn. The iris requires very slight replacing. The cornea may or may not collapse and occasionally there is a large bubble of air present, which does no harm.

I have not had any cases of inversion of the iris. Once the operation was followed by intraocular hemorrhage, after the patient had been returned to bed; and in another case the vitreous was picked up when making a second attempt to take up the lens after it had been dropped.

After replacing the iris, atropin is instilled and the usual cataract dressing applied. The most troublesome after results have been the appearance of a rather obstinate, striped keratitis and, in a few instances, a prolonged low grade cyclitis with the appearance of vitreous opacities. Iritis has not seemed to be of much consequence. The visual results, as might be expected in the uncomplicated cases, are excellent. I believe this method of treating cataracts possesses very satisfactory possibilities when employed in properly selected cases.

VACUUM METHOD OF INTRACAPSULAR CATARACT EXTRACTION.

A. S. GREEN, M.D., AND L. D. GREEN, M.D.

SAN FRANCISCO, CALIFORNIA.

This paper calls attention to some dangers of suction extraction of cataract. It suggests precautions to be taken and a modification of the apparatus for securing a vacuum and the control of the vacuum.

The intracapsular cataract operation as advanced by Barraquer has recently received a great deal of attention, and since his erisiphake has been placed on the market a great many ophthalmologists will undoubtedly undertake to operate with it, without fully understanding its limitations and dangers. Realizing that many eyes may be sacrificed on that account, we are offering this preliminary communication as a warning.

In order to obtain first hand information, one of the writers recently visited Professor Barraquer in Barcelona. The apparent ease with which a cataract was removed with the erisiphake greatly impressed us, as it apparently likewise did many other ophthalmologists in Europe who were privileged to witness Barraquer's operation. However, upon a more careful study of the operation, and its results on a series of forty-six cases which we have operated upon in San Francisco, we have somewhat modified our views, and have reached some fairly definite conclusions. At the outset we can state from careful study and observation, that all forms of senile cataract are not adapted for the Barraquer operation. Its limitations, like those of the Hulen method, are greater than those for the Smith-Indian operation. With a thoro understanding of these limitations, the Barraquer operation (or its modifications) is indeed a valuable contribution to cataract surgery.

While the object of the Barraquer operation, like that of the Smith-Indian operation, is the removal of the lens within its capsule, the effect upon the ocular contents is somewhat different. This is due to the difference in the mechanical principles involved; one depending largely upon expression of the crystalline lens while the other is dependent upon extraction. In the Smith-Indian operation, pressure is applied

at the limbus below, forcing the ocular contents upward and forward. By special manipulation the suspensory ligament is broken and the lens gently massaged into the wound, the cornea is gradually tucked under the lens, which is thus expelled.

As opposed to this, the principle

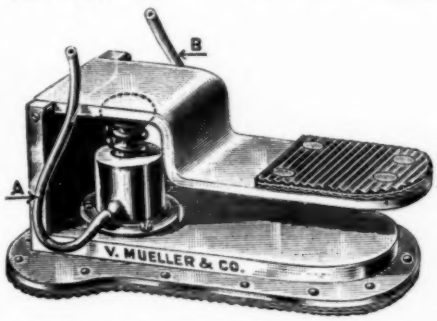

Fig. 1. Foot valve for controlling suction. "A" Rubber tubing leading to motor. "B" Tubing leading to cannula.

upon which the Barraquer method depends—like its predecessors, the Hulen method described in 1910, and other even earlier similar methods—is the application of a vacuum cup to the surface of the lens, suction holding the cataract while it is being removed from the eye. Barraquer claims that an additional and very important factor in his apparatus is, that his electric motor pump transmits a vibratory impulse to the lens which helps to rupture the suspensory ligament before the cataract is withdrawn. Serious consequences may result from either of the methods if too much force is used. If too great pressure is exerted by the Smith-Indian method, an expulsion of vitreous is likely to occur, followed, altho very rarely, by a choroidal hemorrhage. Too much traction on the lens exerted by the suction method may cause a displacement of the entire intraocular contents, that sometimes results in a detachment of the retina. There thus appear certain factors in the two types of operation which are more or less objectionable.

Those who have the Barraquer apparatus will avoid many difficulties if they will observe certain precautions in handling the instrument. The motor pump, as well as the canula of Barraquer, which is manufactured by Cusi, is wonderfully well constructed. The pump is small, compact, beautifully finished and sufficiently powerful if properly handled. It is necessary to use the right amount and quality of oil. We have found that the oil known as "Household Lubricant" of the Standard Oil Company of California answers this purpose admirably. It is advisable to measure the oil for every operation to make sure of the proper quantity in the pump, as some is apt to leak out and insufficient suction result. The canula must be kept clean, the valves in working order and the holes open.

We have been deeply chagrined on attempting an operation to find that there was a little or no suction, due to the fact that the canula leading from the vacuum cup to the handle of the instrument had been clogged by coagulated blood. Since then we have made it a practice to insert a wire into the canula before sterilization. We find it advisable to test the whole vacuum system with a mercury column to determine the degree of suction. If there is a leak, the column of mercury instead of rising to 27 or 28 inches may rise only to 5 or 6 inches. This leak should be remedied before the operation is begun. As an added precaution, it has been our custom to test the suction just before inserting the cup into the eye by applying it to a finger cot partly filled with water and noting the degree of suction.

Fig. 2. Cannula with cup. "A" Actual size of cup.

There are certain mechanical inconveniences that exist in the Barraquer apparatus, that interfere somewhat

with the delicacy of manipulation. To overcome these, we have made some modifications which seem to us to reduce these objections to a minimum. The vacuum in the Barraquer apparatus is engaged or released by pressing on the valve with the thumb. This must of necessity cause a certain cramped position of the hand, and all

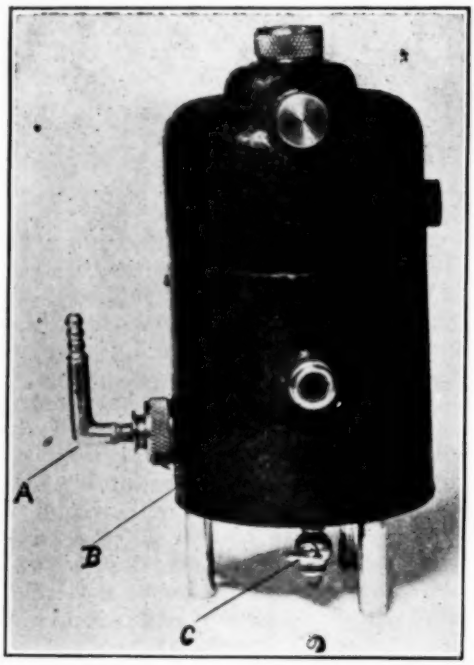

Fig. 3. Barraquer motor pump as modified. A, Right angle connection for rubber tube which prevents oil from dripping out of pump. B, Window in side of pump indicates proper level of oil. C, Stopcock allows easy drainage of oil.

the time the vacuum is maintained, the pressure must be applied until the cataract is extracted. This interferes with the tactile and muscle sensibility of the hand, and in an operation as delicate as is required to extract a cataract, this is certainly undesirable. Furthermore, the mechanism required for such a perfect valve as the Barraquer instrument possesses, makes the instrument heavier than it should be. With these objections in mind, we have devised a floor valve to be controlled by the foot of the operator, thus eliminating the valve in the canula.

We have incorporated an air vent in the valve, which permits the motor to idle without the danger of drawing oil from the pump into the canula, as sometimes happens in the Barraquer apparatus. By transferring the valve from the canula to a foot valve, it permits the use of a very light canula that is held in the fingers as delicately as a cataract knife. We have made the cup round, instead of oval, so that a larger area of the lens surface will be grasped with less danger of rupturing the capsule.

In the Barraquer pump, as at present furnished, we have found it a little inconvenient to let out the oil, which is controlled by an ordinary screw at the outlet in the bottom of the apparatus. To overcome this we have had inserted a small air tight stopcock, which simply requires the turning of the handle to let out the oil. This can easily be attached by any first class mechanic.

TYPES OF CATARACTS SUITABLE FOR INTRACAPSULAR EXTRACTION.

As a general principle which must not be overlooked, only certain types of eyes are suitable for intracapsular operation.

A. It is usually advisable to limit the intracapsular operation to patients over the age of sixty, because the younger the patient the greater the difficulty encountered in breaking the suspensory ligament.

B. Early in our experience with the Barraquer operation, we found that we had to eliminate the tumbler or Morgagnian cataracts from this procedure. The capsules of these cataracts are so friable, that the application of the cup of the canula to the surface of the lens almost invariably breaks it. The effect is usually a partially dislocated lens combined with a poor capsulotomy, with the lens matter, which is very difficult to remove, scattered about in the anterior part of the eye. In these cases the suspensory ligaments, as well as the capsule, are very weak and such cataracts should be removed by the Smith-Indian tumbler procedure, or a capsulotomy done and the lens matter thoroly irrigated from the anterior

chamber. This lens matter from such disorganized cataracts is very irritating to the eye and often produces severe inflammation. Under this type must also be included the "swollen lens," which is an early stage of the Morgagnian cataract, and is indicated by the very shallow anterior chamber and the pearly homogeneous appearance of the cataract.

C. All things being equal, patients with cadaverous or deep set eyes and lax lids afford the greatest safety. The more prominent the eyeball the greater the danger. A little reflection on the mechanics involved will show the reason for this. In a deep set eye the lids and brow can exert very little direct pressure upon the eyeball because of the poor leverage. On the other hand the lids and brow possess a great deal of leverage with protruding eyeballs. In addition to this, the recti muscles seem to exert great traction on the globe, so that occasionally one may actually see the recession of the eyeball in the orbit at some stage of the operation. All of this combines to increase the intraocular tension, so that when the eyeball is cut open, there exists a far greater danger from expulsion of the intraocular contents than is the case in deep set eyes. This power to increase intraocular tension we have repeatedly demonstrated with the aid of the tonometer.

In delivering the lens by the vacuum method, one of three possibilities may occur, if the suction is strong enough to hold the lens to permit of its removal:

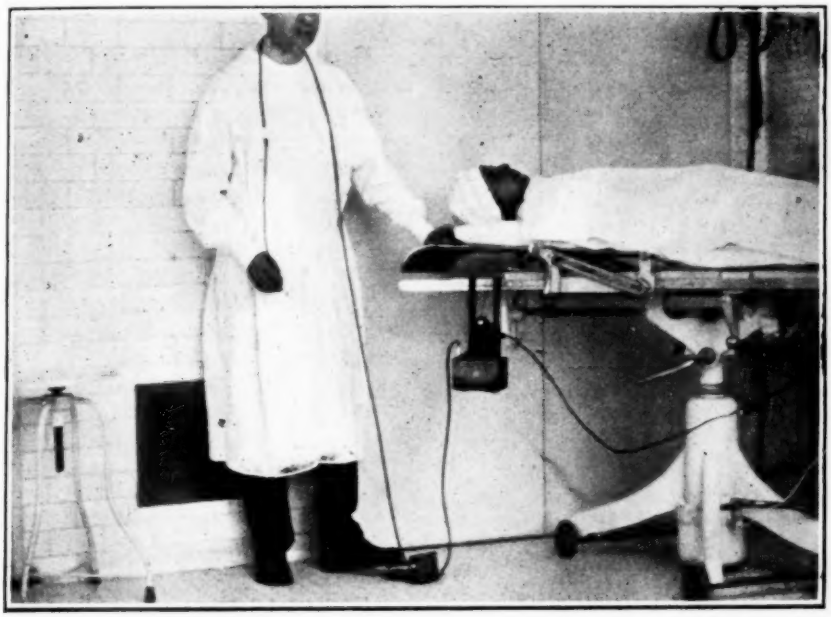

Fig. 4. Apparatus connected ready for use.

1. The cataract may be removed with little difficulty followed by a beautiful result.

2. The capsule may rupture, with the result that a poor capsulotomy has been done.

3. The cataract may be removed, but the strong pull required to break the suspensory ligament may result in a detachment of the retina.

The intracapsular operation affects the ocular contents in different ways. In the Smith-Indian operation it is sometimes necessary to use more pressure to rupture the suspensory ligament and deliver the lens than is absolutely safe. In such cases the whole

vitreous body may be displaced, causing a very much distorted pupil or expulsion of vitreous. To reduce the amount of pressure often used to express a cataract by the Smith method, and the amount of traction sometimes necessary by the vacuum extraction method, we have gradually evolved a technic which is a combination of expression and extraction, thus greatly reducing the dangers inherent in both methods.

METHOD OF PROCEDURE.

Having decided that the case is suitable for the intracapsular operation, the patient is assured of a good night's rest with a sedative the night before the operation. The following morning the lids are injected with 2 c.c. of 2% novocain one hour before operation, and 1 drop of 1% atropin instilled, while 1 drop of 5% cocain is dropped into the eye every 5 minutes for 6 or 8 doses.

The incision, with a conjunctival flap, must embrace the full half of the cornea. For the beginner in this method, an iridectomy is most advisable, as there will be fewer complications during and after operation. The motor is turned on, the conjunctival flap is grasped with forceps in the left hand, the cornea is raised, and the canula, held in the right hand, is introduced and lightly placed upon the cataract. The valve is now engaged and a few seconds allowed for the spoon to become firmly attached to the anterior capsule. If this time is not given, the spoon will simply slide off, necessitating repeated attempts to hold the cataract.

When satisfied that the lens is being firmly held, the canula is gently rolled between the thumb and index finger so that the upper border of the cataract is tilted forward into the wound, at the same time drawing the cataract out of the eye. At the moment when the rotation for the delivery of the lens starts, the left hand releases the conjunctiva, and the curved iris forceps which held it is shifted to the lower part of the eye near the limbus, and by gentle pressure assists in delivering the lens. We thus attain an expression-extraction with a division of the forces in each.

We are deeply indebted to Colonel Henry Smith for many valuable suggestions in the modification of the vacuum apparatus.

RESULTS OF CATARACT OPERATIONS PERFORMED BY COL. HENRY SMITH AT WILLS HOSPITAL, PHILADELPHIA, PA.

WILLIAM ZENTMAYER, M.D.

PHILADELPHIA, PA.

This report of the results obtained in a small series of operations done by Col. Smith is based on a longer observation of the cases after operation than has usually been possible in the practice of the operator. The unfavorable conditions under which he operated are also pointed out. Read before the Section on Ophthalmology, College of Physicians of Philadelphia, November 17, 1921. (See also p. 130.)

In the spring of the present year, the medical profession of the U. S. was fortunate in having as their guest a man whose reputation as a surgeon had made his name an ophthalmic household word. For years his name had been linked, and will always be linked, with a method of cataract operation he had perfected to meet the exigencies of an unusual situation. Ophthalmic literature holds the accounts of many who had visited his Indian clinic and fallen under the spell of his vigorous personality, and had profited by his instructions and generous disposal of operative material to their use.

Because of this and, furthermore, because it was hoped that the results secured by Col. Smith would make a stronger appeal for the operation than had the results secured by the American advocates of the operation, Col. Smith's coming was looked forward to with great interest. Of Col. Smith's visit to Philadelphia I shall speak only of what was seen, what occurred and what resulted at Wills Hospital. It is not necessary to dwell upon personal eccentricities as these, as always, have received more attention than essentials. Nor is it necessary to describe in detail the operation as performed by Col. Smith, but it will not be amiss to critically consider the innovations in the technic and the results secured.

Considering the operation as performed by Col. Smith, one thought is preeminent; that the procedure has been developed by a man of great originality to meet the demands of an unusual situation. A situation which, in the mind of the writer, required that the patient's stay should be as short as possible, that little or no searching study, physical or laboratory be made, little after treatment carried out and above all no secondary operation be called for. The method used in attempting to render sterile, so far as possible, the conjunctival culdesac was probably introduced because of lack of preoperative preparation and postoperative treatment. To the technic for straightening out the folds and recesses of the conjunctival sac, for which there can be nothing but praise, is added the questionable use of a flushing solution of a nature and strength calculated to be very irritating if not destructive to the epithelium of the cornea and conjunctiva, and having in it the possibility of defeating the very end aimed at, prevention of infection.

The method by which the lens is started from its bed and the zonule ruptured calls for a pressure which in most cases is far greater than can with safety be employed, and is much greater than one would be led to expect from the description of the operation.

The toilet of the eye seemed, and in many cases was, of necessity incomplete because of the welling out of vitreous. Often, the upward rotation of the eyeball was carried to such an extreme because of either the threatened or actual escape of vitreous, that the final steps of the delivery of the lens and the replacement of the iris were done in the dark, or so far under cover of the upper lid as to embarass the operator.

As seen by the writer there were many admirable points in the technic which can be used in other methods of cataract extraction, for which we should feel very grateful to Col. Smith. The method employed in flushing the culdesac (aside from the solution); the control of the orbicularis muscle;

the manner in which the upper lid is held away from the globe, permitting the delivery of the lens with the eyeball rotated upwards instead of downwards, as in the older methods in which a spring speculum is commonly used, are all advantageous.

Features which impressed the writer unfavorably were the strength of the bichlorid solution, 1-3000, employed; insufficient anesthesia in some cases; the way in which the knife was used in making the corneal section seemed to cause an unnecessary drag on the structures of the anterior part of the globe (it seemed not to be the way in which a knife was intended to be used); the technic of the iridectomy, devised presumably to keep the forceps out of the wound, while ingenious and effective in Col. Smith's hands is at the expense of unnecessary injury to the corneal epithelium; the amount of force often required to deliver the lens, and the incomplete toilet of the eye.

The success of a cataract operation must be judged not alone by the visual results obtained, but also by the possible effects of the operation upon the lasting integrity of the eye.

Judged by this standard is the intracapsular operation as performed by Col. Smith an ideal procedure?

Making due allowance for the handicap imposed by having as assistants men who had no experience with this operation, that the operations were performed amid strange surroundings and that the after treatment was not carried out by the operator, but was delegated to others unfamiliar with the complication, the results in the series operated upon at Wills Hospital by Col. Smith compel a negative answer.

The frequency with which vitreous is lost is the serious objection to this method of operating. Aside from the ill effects due directly to this complication, there is even the more serious one of the secondary consequences which arise from the undesirability or inability to satisfactorily complete the toilet of the eye; this results in entanglement of the iris in the lips of the wound, or to actual prolapse of the iris, as well shown in the series.

Loss of vitreous in any amount is harmful, in large amount it constitutes a menace to the eye, as it may lead to late degeneration of the eyeball, detachment of the retina and choroid and, indirectly from incarceration and prolapse of the iris, to secondary glaucoma and late infection.

SUMMARY VISION OBTAINED

6/6 2 cases
6/9 2 cases
6/12 2 cases
6/15 3 cases
6/20 4 cases
6/30 2 cases
L.P. 2 cases
Not recorded, 1 case.

Vitreous loss, 38%.

Incarceration of iris, including 2 cases of prolapse, 38%.

Secondary glaucoma occurred once.

In 2 cases abscission of the iris was necessary.

In one case iridotomy was necessary.

In most of the cases there remained either vitreous haze or definite vitreous opacities.

TABLE OF CASES.

	Service of	Age	Sex	Eye	Iris	Conditon of Cataract	T	B. P.	Loss of Vitreous	Postoperative Course	Refraction	V
1.	Schwenk	78	M	L	N	Immature	20	190 110	Moderate	Striped keratitis persisted for 1 month. Dense hyaloid membrane.	6 months after operation. +10+2. ax. 180°	6/20
2.	Schwenk	62	M	L	N	Mature	17	220 140	Much	3 weeks later. Some pericorneal injection, white mass in upper part of pupil. Faint fundus reflex.	6 months later. +10+1.50 ax. 180°	6/20
3.	Schwenk	76	M	R	N	Mature	20	180 110	Slight	5 weeks later. Still pericorneal congestion. Marked bulging of upper portion of cornea. Many vitreous opacities.		L. P.
4.	Radcliffe	75	M	R	Sluggish	Mature	22	180 100	None	3 weeks later. Moderate ciliary congestion. Many large vitreous opacities. Faint fundus reflex. Marked striped keratitis.	3 weeks later. +9+2. ax. 180°	6/15
5.	Radcliffe	77	M	L	N	Mature	20	170 100	Slight	3 weeks later. Many large vitreous opacities.	3 weeks later. +17+3.50 ax. 165°	6/30
6.	Radcliffe	73	F	R	N	Mature	17	210 110	None	4 weeks later. Moderate ciliary congestion.	10 weeks later. +10+2.50 ax. 30°	6/12
7.	Parker	74	M	R	N	Mature	22	140 100	None	3 weeks later. Pigment on anterior face of vitreous. Some vitreous opacities.	4 weeks later. +11+2.25 ax. 45°	6/20
8.	Zentmayer	47	M	R	N	Immature	14	190 110	None	16 days later. Slight pericorneal injection.	16 days later. +11+2.75 ax. 165°	6/9
9.	Zentmayer	39	M	L	N	Mature	17	180 110	None	30 days later. Prolapse of iris.	6 months later. +10+1.75 ax. 180°	6/6
10.	Zentmayer	69	F	L	N	Hypermature nasal field contracted	24	180 120	None		16 days later +9+4. ax. 180°	6/20
11.	Griscom	51	M	R	N	Immature	28	190 120	Much	4 months later. Prolapse of iris. Continued low grade iridocyclitis. Iridotomy. Capsule adherent to iris divided. 6 months after operation, eye quiet.	6 weeks later. +9+2. ax. 75°	6/30
12.	Griscom	71	M	L	N	Mature	21	160 90	None	15 days later. Eye quiet.	+6+2.50 ax. 15°	6/9
13.	Pontius	79	M	L	N	Mature	17	200 120	None	17 days later. Incarceration of pillar of iris.	17 days later. +7+6. ax. 10°	6/12
14.	Pontius	76	M	R	N	Immature	17	190 120	None	Marked striped keratitis. Incarceration of pillar of iris.	2 months later. +12+0.50 ax. 30°	6/15
15.	Pontius	56	F	R	N	Mature	21	210 140	Moderate	2 days later. Incarceration of both pillars of iris.		L. P.
16.	Holloway	59	F	L	N	Mature	21	170 100	None	2 days later. Incarceration of both pillars of iris.	1 month later. +10+1. ax. 180°	6/15
17.	Holloway	66	F	R	..	Mature	28	180 90	Moderate	12 days later. Incarceration of both pillars of iris.	Not recorded	Not recorded
18.	Holloway	72	F	L	..	Immature	..	...	None		30 days later. +9+4. ax. 150°	6/6

It should also be noted that in Case 9, five months later, there was secondary glaucoma and a prolapse was abscised with a conjunctival flap. In Case 16, fourteen days after operation, iridectomy was done with a conjunctival flap. In Case 17 and Case 18 preliminary iridectomy had been done.

SNOWBALL VITREOUS OPACITIES—ADDITIONAL CASES.*

THOMAS B. HOLLOWAY, M.D.

PHILADELPHIA, PA.

This paper adds reports of four cases to those previously published. It discusses the character of the opacities and their probable etiology.

Three years ago I placed on record four case histories of the condition described by Benson as Asteroid Hyalatis or Snowball Opacities of the Vitreous; and when doing so pointed out that while I was confident that these differed from the cholesterin crystals sometimes seen in this structure, they developed in the presence of the same general and local clinical conditions.

My personal experience seems to indicate that at least two types of opacities that may be differentiated clinically have been grouped under the term of synchysis scintillans; first, those that are typical cholesterin crystals, and secondly, those opacities that to my mind are not cholesterin crystals but typical or atypical types of snowball opacities. Why should they not be differentiated?

Judging from the literature, one would imagine that the condition under discussion was a rare one, since but fourteen cases have been recorded. This I believe to be far from the truth, since ten cases have been personally observed in the past twelve years, while during the same time I have not seen more than two cases of cholesterin crystals in the vitreous. As a consequence, I have almost come to the conclusion that deposition of cholesterin crystals in the vitreous is an unusual manifestation, whereas these snowball opacities, either in the early stage or when well formed, are by no means as infrequently encountered.

While a clinical differentiation, in the light of our present knowledge, is of no significance, the difference between these two types of opacities, as they appear to me, is just as striking as the difference between a piece of tinsel and a tiny cotton ball, or cholesterin in the retina and a white punctate exudate.

*Read before Section on Ophthalmology, Philadelphia College of Physicians, April, 1921.

Since my last report, six cases have been observed by me; one patient's report is not available for review and another record has been mislaid, the remaining four are as follows:

CASE I.—J. H. S., aged 56, was referred to me in October, 1904, by Dr. Wharton Sinkler. He was seen at more or less regular intervals up to 1916. From the time of his early examination, his pupils were of the miotic type, unequal, of somewhat irregular contour, with sluggish reactions. In the left eye in the peripheral nasal field, several well defined choroidal erosions could be seen. The discs were healthy. Full visual acuteness could be obtained by a compound hyperopic correction. The case was specific. In later years he developed incipient lens changes and well defined evidences of sclerosis of his retinal vessels, but no hemorrhages or exudates.

In 1915, he was in a hospital for two weeks owing to bladder trouble, and while there a serum and spinal Wassermann were found to be weakly positive. He was given two injections of salvarsan by the Swift-Ellis method.

In 1919 at the age of 70 years, he again returned with a frequent complaint of smarting and burning of the lids and eyeache. At this time, the pupils were as above noted; incipient opacities were present in each lens. The discs were healthy, but scattered about the posterior pole of each eye were a few yellowish pinhead sized lesions, with a large split pea sized choroidal erosion in the right eye and the previously noted erosions in the left. While a few translucent opacities were present in the vitreous of the right eye, the left vitreous contained numerous characteristic snowball opacities.

The vision of the right eye =6/9?; the left eye =6/6?.

CASE II.—C. R. E., aged 60, came to me in April, 1920, complaining of pres-

byopic symptoms. His vision without a correction was 6/6 and 6/6+. He read .50 type at 48 cm. with a +.75 sphere which he was then wearing. The only glass he would accept for distance was a +.25 cyl. ax. 90° and a + 2.00 sphere added gave him a near point of 24 cm., with a range of 46 cm. There were no pupillary or extraocular muscle lesions.

In each lens there could be noted a delicate annular ring in the cortical layers, made up of fine punctate dots, the diameter of the ring being 7 mm. In the right eye, the whole vitreous body was studded with these suspended snowball opacities, usually round, a few oval, but no strands. While searching the extreme periphery of the eyeground, a curious effect was produced by a large cluster of these opacities. They were situated at the extreme limits of perception; and when seen momentarily, and obliquely, they presented the appearance of a whitish expanse or whitish streaks that I first thought was an exudate, but after more minute study the true character of the manifestation could be determined. The disc was of rather mellow type with soft margins, the superior nasal quadrant being a trifle pale; and here and there on its surface could be noted tiny dots, evidencing the earliest visible stages of hyalin deposits. No lesions of the choroid or retina could be detected, and the retinal vessels did not show distinct evidence of sclerosis and might well be called normal for his age, as far as ophthalmoscopic appearances were concerned.

In the left eye the general appearance of the disc was the same as that described for the right eye, but no hyalin points were as yet visible. In the examination of the vitreous, I had about concluded no snowball vitreous opacities were present, when a passing glimpse of the same manifestation noted in the periphery of the right eye, was detected in the extreme lower and outer periphery. A little further study soon revealed a cluster of some half dozen snowball opacities at this site. No changes were seen in the choroid or retina and no distinct evidence of angiosclerosis.

Case III.—J. G., aged 50, was admitted to Dr. Stengel's service at the University Hospital on January 20th. He gave a history of swelling of the legs as early as 1904. In January, 1919, he began to have headaches, palpitation of the heart, and dyspnea had set in about a month before. On January 17, he went to bed feeling as well as usual, but was awakened with a severe pain in the head, and then discovered he could not see with the right eye.

I shall not enumerate the results of the thoro examination except to say that his blood pressure was 205-140. The phenolphthalein test showed but 10 per cent in two hours. The Wassermann test was negative. Blood cholesterol 219 mgm. per 100 cc. He was found to have a chronic diffuse nephritis; arteriosclerosis of the senile type; myocardial hypertrophy and weakness; relative mitral and aortic regurgitation; hepatic enlargement from congestion. For this report and for certain studies, I am indebted to Dr. O. H. P. Pepper.

As to his eyes: The vision of the right eye was reduced to counting fingers at about five inches, while the vision of the left eye was 6/60. When examining this patient, it was noted that, suspended in the vitreous in the right eye, there were numerous white snowball opacities, characteristic in appearance but smaller than usually seen; varying in size from almost pinpoint to approximately 1 mm., a few tending to the elongated or spindle form. The disc has a pale yellowish tint in the temporal portion, better capillarity on the nasal side. There is an excessive angiosclerosis, characterized by silver wire arteries, with irregular caliber in both sets of vessels, and distinct pressure signs of the veins. There is a well marked perivasculitis, especially along the superior temporal veins. Between the macula and the disc there is a large cluster of pinhead sized whitish exudates. A few

of these, less pronounced, can be noted about other portions of the posterior pole. The whole posterior pole on both sides of the disc appears faintly yellowish, and scattered about this area are a number of linear and flame shaped hemorrhages of varying degrees of intensity. I think there is but little doubt that a thrombosis occurred in this eye.

In the left eye a few delicate fine opacities can be noted in the vitreous, but these are not of the snowball type. The disc margins are almost completely blurred by a well marked exudation and striation, which extend well towards the midzones on all sides. Just beyond the disc, superimposed on this exudation, there is a corona of streak and flame shaped hemorrhages. The macular region shows punctate and mass like yellowish white exudates, such as are usually seen in cases of vasculorenal type. A few punctate hemorrhages are scattered among these, The vessels for some distance beyond the disc are partially or completely covered by the uniform yellowish exudate. The vessels show the same excessive angiosclerosis as in the right eye. Some of the major venous branches appear overfilled.

Case IV.—Mrs. E. R.., aged 64 years, first consulted Dr. G. E. de Schweinitz, 1.25.12, for a change in her correction. At that time there were no intraocular changes. She was first seen by me in January, 1918, when her eyes showed incipient lens changes and decided angiosclerosis of the retinal vessels, but no hemorrhages or exudates. The central part of the vitreous of the right eye contained a few snowball opacities, not of advanced type. Opportunities for complete medical studies were not available.

REMARKS.

Recently, Verhoeff[1] has placed on record the clinical notes of a similar case, and owing to the development of an acute glaucoma, he was enabled to examine the vitreous pathologically and microchemically with his usual thoroness. His findings are of particular interest, because it was the first case so diagnosed to come to pathologic examination.

The patient was a male, aged 75, who had a hemorrhagic retinitis when first seen. Snowball opacities were observed in the affected eye only. Verhoeff's studies permitted him to conclude that the opacities, "consist chiefly of calcium soaps, calcium carbonates, and certain amounts of fatty or lipoid substances in combinations of various grades of stability. Their formation is usually, if not always, dependent upon intraocular angiosclerosis in association with an altered condition of the blood." When speaking somewhat more specifically, he refers to "calcium soap, probably calcium margarat, possibly admixed with insoluble compounds of cholesterol and lecithin." Likewise he very aptly points out that "fats, fatty acids, lipoids and lime salts are apt to be deposited where there is deficient oxygen as in necrotic infarcts and scar tissue.

Elsewhere[2] in speaking of synchysis scintillans, the statement was made that some factor must be required to produce it other than the local condition. This I believe to be equally true of snowball opacities, and it prompted my comments upon hypercholesterolemia and diabetic lipemia. Naturally, I am in accord with Verhoeff's belief that it is a degenerative process, but I hesitate to accept the view that intraocular angiosclerosis is the most important factor, altho it is doubtless a conspicuous one.

I venture to say that clinically the condition is not encountered in one percent of the cases of excessive angiosclerosis; neither has it been present in a definite percentage of the cases of thrombotic obstruction of the central artery or vein that I have seen. Still further, it has been observed in cases where there were but slight if any clinical evidences of angiosclerosis, as in the woman aged 35, as reported by Starck, and in Case II of the present report.

Should not more stress be put on the altered condition of the blood, to which both Verhoeff and myself have

referred? Just what this is, or where, why and how certain elements gain access to the blood stream, is still undetermined. Given a case of bilateral excessive angiosclerosis of the retinal vessels, or if you please, of the intraocular vessels, it is just as difficult to explain why the opacities are usually unilateral, as it is to explain it in the presence of a probably much altered blood picture. Considering the ages of the patients usually affected, the relationship of a general arteriosclerosis, as this may affect the functional activity of some distant organ or structure as well as the eye, is not to be overlooked; but here again the important link is missing.

Comment has already been made (previous report) upon the fact that these opacities are not cholesterin as we are accustomed to seeing it. In the light of our present knowledge of the chemistry of the group of substances probably concerned in snowball vitreous opacities, I made the vague, but possibly not far afield, suggestion that these opacities were formed during the same or similar process that has to do with the deposition of cholesterin in the vitreous. What conditions must pertain to the eye, the blood, possibly in the fats or lipoids themselves, if these are the offending agents, and probably in some distant structures or organs, still remains to be solved. If the leads in this branch of chemistry are short and abrupt in their terminations, our clinical interpretations must necessarily be vague and conjectural.

In my previous article I referred to the work of Chauffard and Laroche, and in a recent report on deposits of chloesterin these same two investigators in association with Grigaut[3] point out some interesting observations. They believe that we may have an active hypercholesterolemia which is chiefly of suprarenal origin, that it may be passive owing to hepatic insufficiency, while food hypercholesterolemia may be regarded as a third type. It may exist as a blood manifestation alone, or this may be associated with a tendency to local deposits, as in xanthelasma. As ocular manifestations, they refer particularly to the white patches seen in the retina in cases of nephritis, diabetes and in certain cases of pregnancy. They also comment upon the infiltration of atheromatous arteries with lipoids and among them, cholesterin.

Mention is also made of the experimental work of Anitchkow Wacker and Hueck, who produced arteriosclerosis in rabbits by the injection of large doses of cholesterin. I might add that Mueller[4] of California has shown that the cholesterin fed to dogs was absorbed from the alimentary tract thru the lymphatic system.

As far as I am aware, the cholesterol content of the blood has not been determined in any case of snowball vitreous apacities, prior to this report; and while it was found to be increased in Case III, other clinical findings present tend to oppose its being regarded as having direct relationship.

Altho not particularly pertinent, it is interesting to refer to the recent contribution of Wagener and Wilder in their study of 300 cases of diabetics observed at the Mayo Clinic, 44 of whom showed evidence of retinitis. After referring to the observations of Onfray, Garrod and Moore, they conclude that this manifestation is almost always accompanied by vasculorenal disease and that the pathologic vascular changes are the primary cause.

It is now the vogue to refer various unexplained questions to the realm of the endocrines, and since thinking aloud as well as presenting well conceived ideas is permissible at a meeting of this character, why might not some of the other ductless glands have the same relation to lipoids, as yet unknown, that the suprarenals, according to Chauffard, Laroche and Grigaut, may have to cholesterin?

What conditions might possibly be confused with these opacities?

First, synchysis scintillans, but here the *glittering* shower ought to be distinguished from the almost *dead white* or *lardaceous appearance* of those snow-

ball opacities that are in focus, and the vague corpuscle appearance of those which are not in focus, which gives an appearance somewhat analagous to that of phosphates in the urine. Still further, the snowball opacities when well developed, have a greater tendency to be globular and not flat. The movement in the vitreous is also distinctly different. Hill Griffith has referred to opacities that were white, glistening, round discs. In some of the cases I have observed that certain of the opacities, for they are not all of uniform size, have been small and white and hardly well enough developed to appreciate readily a third dimension, but they have never been glistening and they do not scintillate or sparkle. One cannot study these cases without wondering to what extent, these white opacities may have figured in the controversy as to whether a silver or golden appearance was more frequent in cases of synchysis scintillans.

Second, those rounded and whitish opacities sometimes seen on the surface of detached portions of the retina. In my first report reference was made to a history recorded by D'Oench; and while it was clearly stated that the white dots were scattered over the detached portion of the retina, Valk, who cited the case, assumed they were in the vitreous. These rounded opacities are seen in certain cases of detached retina and are doubtless familiar to all of us. A patient that I now have under observation affords a beautiful illustration of them. These may be the dots to which Elliot refers as observed on the retina in so many of the eyes examined pathologically after couching.

Third, they are not to be confused with the large round corpuscle like vitreous opacity seen in certain of the severer types of uveitis, in my experience chiefly in those of a tuberculous character.

Fourth, when clusters of these opacities occur in the extreme periphery, they might be mistaken in a hurried examination for the margin of an exudate. Case 2 illustrates such a possibility.

Fifth, mention might be made of the small white nodes seen in the vitreous in certain cases of glioma of the retina, such as have been described by a number of observers.

In conclusion, I may say that judging solely from my personal experience, I believe that the type of opacity under discussion has contributed more to the diagnosis of synchysis scintillans than has the actual cholesterin crystal. Verhoeff's observations have done much towards providing more definite knowledge in regard to this condition and it is to be hoped that those who may chance to secure material of this character will afford him further opportunities for the study of these opacities.

Since the above paper was read, I have found an interesting study by Valentin (Hoppe-Seyler Zeitschr. f. physiol. Chemie, 1919, cv. 33) "On the Fat-like Substances Found in the Vitreous Body of the Eye of the Horse." His work was based on a study of more than 200 eyes. In addition to the usual constituents, grape sugar and lactic acid were demonstrated in the vitreous.

In speaking of tyrosin, he concluded that the amount even of combined tyrosin in the vitreous is so slight that its excretion must necessarily be doubtful. The opaque particles were examined in polarized light, with various chemical reagents and with Sudan II, neutral red and Nile blue sulphat. In nearly all the tests, the presence of cholesterol, phosphoric acid, cholesterin crystals, phosphatids, soaps, neutral fats and occasionally glycerinester and nitrogen could be demonstrated. The tests also showed that the fatty and fat like substances in the vitreous play an important part in the turbidity referred to.

As a result of his studies of the normal vitreous, he found that it contained soaps which hold various lipoid substances in solution, such as: glycerinester, cholesterinester, free cholesterin and phosphatid containing cholin.

Under abnormal circumstances these substances, normally held in solution, occur in the form of droplets, and in addition there is an excretion of soaps. The study also shows that the opacities as a rule are not caused by a single substance, but by a combination of several substances, of which sometimes one, sometimes another predominates. All of the substances show lipoid characteristics, sometimes neutral fat, sometimes free cholesterin or cholesterinester or phosphatid. In addition to the flakes (exudate residue) no substances except those of a lipoid nature were found as constituents of the opaque particles, in spite of the large number of eyes examined. Tyrosin was never excreted. The opacities therefore seem to be based on a process analogous to that which causes formation of gall stones from the bile.

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THE VISUAL PATHWAY AND THE PARANASAL SINUSES.

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This address by the Professor of Anatomy of Jefferson Medical College brings into convenient form the leading facts regarding the anatomic relations of the optic tracts, chiasm and nerves to the accessory sinuses and the nose. It was given before the Section on Ophthalmology of the American Medical Association, June 8, 1921, and is published here by courtesy of the Journal of the A. M. A.

Before entering into a discussion of the anatomic relationships which exist between portions of the visual pathway and the paranasal sinuses, it is essential that reference be made to a few cardinal points in the intrinsic anatomy of the visual pathway: The retina from the point of view of ontogenesis or embryology is a part of the brain, and the socalled optic nerve is a brain fiber tract supported by neuroglia and other elements. Moreover, the nerve is surrounded by tubular prolongations of the three meningeal membranes—pia, arachnoid and dura.

The meningeal extensions also prolong the subdural and the subarachnoid spaces along and around the optic nerve as far as the sclera, where they become continuous with the posterior group of tissue spaces of the eyeball (Figs. 1-3).

Strictly speaking, there is nothing in the visual apparatus which morphologically corresponds to a peripheral nerve. The percipient elements—the rods and the cones of the retina—are directly stimulated by the light waves. There is, of course, an analogy between the rods and cones and a peripheral nerve, but they are not morphologic equivalents. Indeed, the retina is not unlike the brain proper, since, it is made up of supporting elements and neurons; the important neurons being (*a*) the rods and cones, (*b*) the bipolar cells, (*c*) the horizontally placed correlation neurons and (*d*) the socalled ganglion cells. The axons of the latter converge toward the optic disc, pierce the vascular and fibrous tunics of the eyeball, and then course centrally as the conventional optic nerve, the optic commissure and the optic tract, to terminate variously in the thalamus, the metathalamus and the midbrain. Since identically the same fibers or axons form without interruption and in order from before backward the optic nerve, the optic commissure and the optic tract, it would be more appropriate to designate the entire pathway the optic tract.

The principal fibers of the optic tract above referred to, together with their cell bodies or nutritional centers in

the retina, are neurons of the third order in the visual pathway. The fibers are medullated in their retro-ocular portions but lack a neurilemma, being in general agreement with brain and spinal cord fiber tracts in which the neurilemma is absent or greatly reduced. It is significant in this connection that nerve fiber tracts of the brain and spinal cord lack power to regenerate from an intact central part, while the peripheral nerve fibers possess this power. While the neurilemma cells and their protoplasmic bands do not form new nerve fibers, they appear to be the deciding factor in nerve regeneration by forming tubelike pathways for the growing central stumps. The optic nerve, commissure and tract behave like a spinal cord pathway as regards regeneration. Therefore, early and proper treatment of diseased topographically related structures of the optic pathway would appear of vital importance.

The optic nerve is said to contain four anatomically and physiologically unlike sets of fibers: (*a*) those carrying visual impulses to the brain; (*b*) those going to reflex centers, e. g., the pupillomotor centers; (*c*) the centrifugally directed fibers; e. g., the socalled retinomotor fibers; and (*d*) the interretinal fibers. From each retina three bundles of fibers arise; (*a*) those from the lateral half going centrally on the same side; (b) those from the mesial half going centrally on the opposite side after decussation in the optic commissure, and (*c*) those from the fovea centralis, in man and monkey, going centrally partly on the same side and partly in the op-

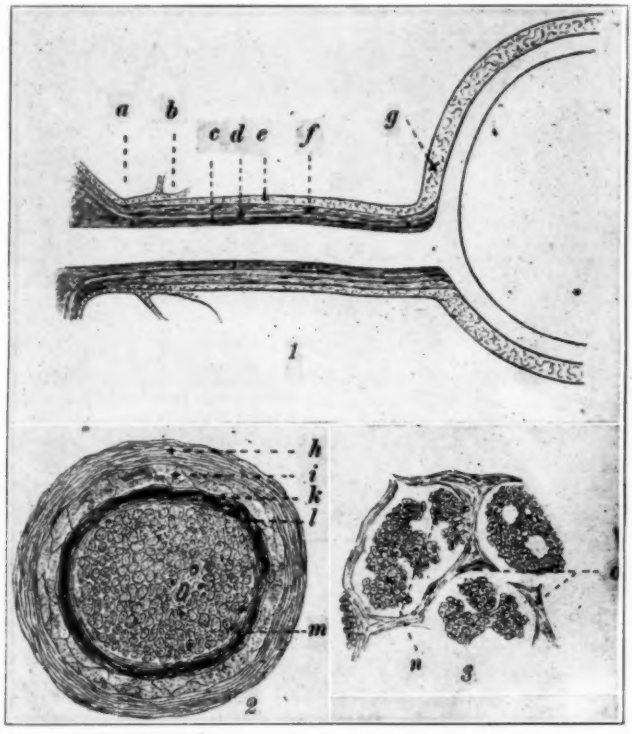

Fig. 1.—Diagram of a horizontal section of the socalled optic nerve and part of the eyeball, showing the relations of the meningeal sheaths and the interfascial spaces; *a*, sphenoidal sinus; *b*, posterior ethmoidal cell; *c*, subarachnoid space; *d*, subdural space; *e*, supravaginal cr *a*, extradural space; *f*, dura; *g*, space of Tenon.

Fig. 2.—Cross section of the optic nerve; *h*, dura mater; *i*, subdural space; *k*, arachnoid mater; *l*, subarachnoid space; *m*, pia mater.

Fig. 3.—A considerably magnified portion of a cross section of the optic nerve; *n*, fascicles of optic nerve; *a*, fibrous septa.

posite after decussation in the commissure. It would appear that the several bundles occupy fairly definite and constant positions in the pathway in their course centrally; for example, the macular fasciculus is lateral in position for about half the distance from the eyeball to the optic commissure, while in the remaining portion of the tract it occupies a central position, and is farthest removed from the more abundant peripheral blood supply.

Experimental evidence tends to show that pupillomotor impulses travel centrally to the superior collicular body without decussation in the commissure, the consensual reflex being due to fibers from the superior collicular body going to the pupillomotor centers of both sides. Little is known of the real purpose of the retinomotor fibers; trophic and vasoconstrictor functions have been suggested. The interretinal fibers are even more obscure. It is believed by some that the impulses passing over them have to do with the socalled sympathetic inflammations; others ascribe binocular contrast and after images to them; while a third group of workers believe they convey impulses which cause retinal changes in one eye when light falls on the other.

Therefore, in dealing with the topographic interrelations of the optic pathway and the paranasal sinuses in man, one is concerned with a partially decussated brain fiber tract made up of anatomically and physiologically unlike elements, the cell bodies or nutritive points of most of the neurons being located forward in the retina. Moreover, since the optic nerve segment of the pathway is surrounded by the meningeal layers and their interspaces, whatever may be said regarding the topographic relationships of component neurons of this part of the pathway applies with equal force to the meningeal sheaths and the related intervaginal tissue spaces.

The optic nerve leaves the eyeball approximately 3 mm. to the mesial side of its posterior pole, and follows a slightly flexuous or serpentine course dorsalward, medialward and cranialward toward the optic canal in the apex of the orbit. After traversing the optic foramen medial and cephalic to the ophthalmic artery, the optic nerve courses intracranially, converges toward the midline, and after a variable distance meets with its fellow in the formation of the optic commissure.

It is, therefore, obvious that the two optic nerves are far apart ventrally where they leave the eyeballs and gradually converge more and more, ultimately to merge in the vicinity of the tuberculum sellae (olivary eminence), between the internal carotid arteries. For some distance behind the eyeballs, the optic nerves are separated from the thin osseous walls of the paranasal sinuses by the interposition of a goodly amount of orbital fat. However, as the optic foramen and the optic commissure are neared, the topographic relationships between the optic pathway and the paranasal sinsuses become more and more intimate, ultimately resulting in very many cases in the optic nerve and commissure coming into actual contact with the thin osseous walls or the mucous membrane (when osseous dehiscences are present) of certain of the paranasal sinuses, especially the posterior ethmoidal and the sphenoidal. Therefore, the portions of the visual pathway that particularly concern us in the further discussion of the problem before us are the conventional optic nerve and the optic commissure.

From the point of view of regional anatomy, the optic nerve may be divided into (*a*) intraocular, (*b*) intraorbital (*c*) canalicular and (*d*) intracranial segments. Of these segments the canalicular would appear particularly vulnerable in certain disorders, e. g., in edema of the nerve, since it is surrounded by an unyielding osseous ring or canal. However, apart from this, it matters not what part of the optic pathway (nerve, commissure, tract) is involved, since the cell bodies or chief nutritive portions of the neurons are located in the retina, and no synapse station occurs between the retina and

the primary visual centers. Of course, the precise manifestation would depend on the location of the lesion e. g., at the commissure or in front or back of it.

The combined length of the intraorbital, canalicular and intracranial portions of the nerve varies in different individuals, and to some extent on two sides of the same individual. The intraocular segment of the optic nerve need not detain us here. While the whole nerve varies in length, the greatest variation occurs in the length of the intracranial segment, the optic commissure being formed at a variable distance dorsal to the optic foramen, or better the optic canal. Table 1 is illustrative of this variation.

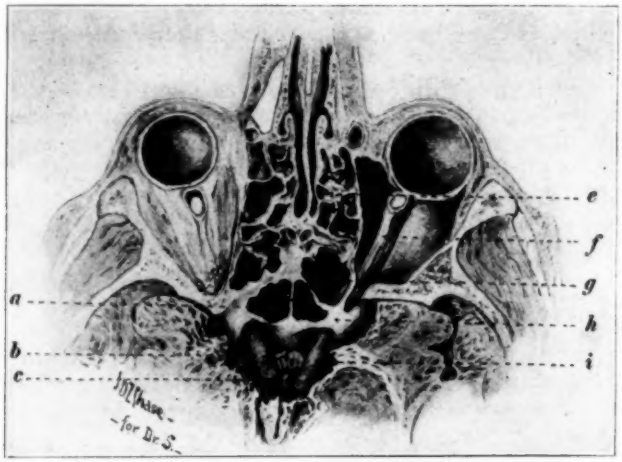

Fig. 4.—A dissection of the optic nerve and commissure and the sphenoidal sinuses and ethmoidal labyrinths; *a*, sphenoidal sinuses; *b*, hypophysis cerebri; *c*, optic commissure; *e*, anterior ethmoidal cells; *f*, orbital segment of optic nerve; *g*, posterior ethmoidal cell; *h*, canalicular segment of optic nerve; *i*, intracranial segment of optic nerve

TABLE 1.—LENGTH OF INTRAORBITAL, CANALICULAR AND INTRACRANIAL PORTIONS OF OPTIC NERVE.

Total Length	Topographic Segments		
	Intraorbital	Canalicular	Intracranial
Mm.	Mm.	Mm.	Mm.
49	27	6	16
38	28	6	3
43	30	5	8
33	25	4	4
46	25	5	16
30	20	3	7

In order to facilitate further consideration of the topographic interrelations of the optic nerve and the paranasal sinuses, it is well to divide the optic nerve into sinus and nonsinus portions, using sinus portion to mean that segment of the nerve which is 2 mm. or less from the walls of certain of the paranasal sinuses. Usually some portion of the segment is in actual contact with the osseous wall or the mucous membrane, either of one of the posterior ethmoidal cells or of the sphenoidal sinus or of both. The nonsinus segment is beyond the arbitrary 2 mm. limit and does not particularly concern us here. It has been observed that the farther removed the optic nerve is from the walls of diseased paranasal sinuses, the less liable the nerve is to secondary involvement. Table 2 is illustrative of the lengths of the sinus and nonsinus portions of the optic nerve as compared with the total length of the nerve from the eyeball to the optic commissure, in a large series of cadavers investigated.

TABLE 2.—LENGTH OF SINUS AND NONSINUS PORTION OF OPTIC NERVE.

	Length of Optic Nerve in Millimeters					
	Total Length		Nonsinus Portion		Sinus Portion	
Cadaver	Right	Left	Right	Left	Right	Left
A	45	45	24	21	21	24
B	37	35	14	13	23	22
C	44	44	21	22	23	22
D	40	40	19	23	21	17
E	55	48	28	27	27	21
F	43	41	15	15	28	26
G	48	46	24	20	24	26
H	39	42	15	14	24	28
I	38	40	16	20	22	20
J	40	40	30	10	20	20
K	37	36	14	14	23	22
L	54	48	28	27	26	21

As shown in Table 2, a goodly segment of the optic nerve is intimately related to the walls of certain of the paranasal sinuses. The actual character of the relationship necessarily is inconstant. The great variation in the size, shape, number and type of the several paranasal sinuses in different individuals, and on the two sides in the same individual, precludes any constancy in the topographic interrelations of the parts concerned. At best the osseous walls of the paranasal sinuses are thin; often of a filmy nature. Again, the osseous walls of the sinuses at places are developmentally defective, leading to a condition whereby the mucous membrane of the related sinuses comes into actual contact with the dural investment of the optic nerve and with the optic commissure. Occasionally the osseous lateral wall of the sphenoidal sinus is so deficient that the mucous membrane, lining its cavity, protrudes as a hernia or a diverticulum. Rarely, of course, very small sphenoidal sinuses are encountered with relatively thick walls, thereby precluding intimate relations with the optic nerve. Here the latter is less likely to become involved in sinus disease. The frequency of involvement appears to be in direct ratio with the intimacy of topographic relationship of the sphenoidal sinus and the optic nerve.

One (or more) of the posterior group of ethmoidal cells is nearly always in intimate topographic relationship with the optic nerve. The precise relationship, as stated before, varies. In many instances, the optic nerve molds the lateral wall of the most dorsal of the posterior group of ethmoidal cells, the wall frequently being thrown into moundlike relief by the nerve (Fig. 4). Again, the nerve comes into relationship with two or more posterior ethmoidal cells, depending in a measure on the number of cells differentiated in the posterior ethmoidal labyrinth.

Not infrequently the hindmost of the posterior group of ethmoidal cells is relatively large and encroaches over and under the usual site of the optic foramen. This results in the optic foramen elongating into a true osseous

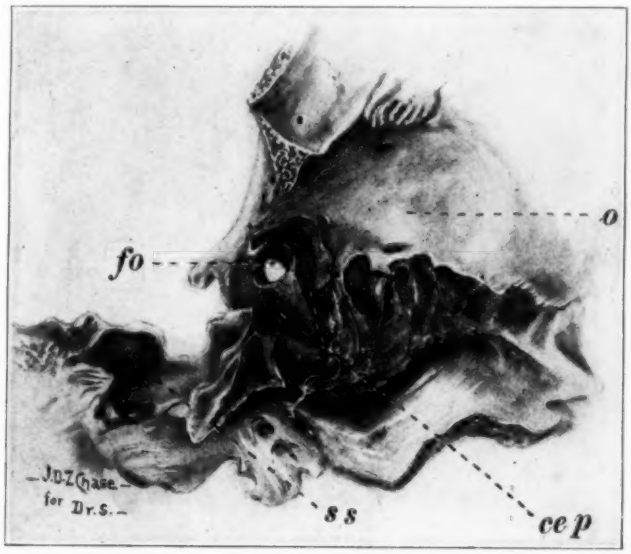

Fig. 5.—Dissection of a specimen in which a large posterior ethmoidal cell encroaches on the usual confines of the shenoidal sinus. Particularly note how the sphenoidal sinus has surrounded the optic canal, resulting in an elongation of the canal and exposure of a considerable segment of the optic nerve to the ethmoidal cell. *fo*, optic foramen or canal; *ss*, sphenoidal sinus; *o*, orbit; *cep*, posterior ethmoidal cell.

canal, located in a sense within the ethmoidal cell in question (Fig. 5). This type of cases is very important because the canalicular segment of the optic nerve is markedly increased in length; moreover, in vital relationship with the ethmoidal cell. Indeed, the bone of the canal is often defective and at best of a papery delicacy, thus directly exposing the optic nerve to the mucosal lining of the ethmoidal cell for a goodly distance. In such cases the sphenoidal sinus is crowded from its usual relationship with the optic nerve (Fig. 5).

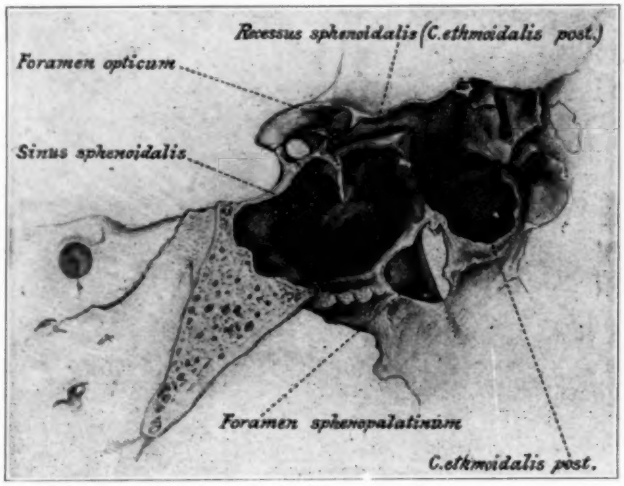

Fig. 6.—Extension of a posterior ethmoidal cell along the optic foramen over the sphenoidal sinus. In this type the sphenoidal sinus does not bear an intimate relationship to the optic nerve.

Another morphologic type of posterior ethmoidal cell encountered is one which extends into the body of the sphenoid over the sphenoidal sinus (Fig. 6). Cells in this position always replace the sphenoidal sinus as regards optic nerve relationship. The type is not uncommon, and it is clearly obvious that one can have a rather aggravated type of sphenoidal sinus disease without involvement of the optic nerve.

In general, it may be said that the hindmost of the posterior group of ethmoidal cells are of most importance in this connection; however, at times other posterior ethmoidal cells not in actual contact with the sphenoidal sinus establish intimate topographic relationships with the optic nerve. The most dorsal of the anterior group of ethmoidal cells occasionally come into fairly intimate relationship with the optic nerve—this when the anterior group of ethmoidal cells encroaches on the more usual confines of the posterior group. It must always be recalled that it is not the location or the topography of the ethmoidal cells that determines the groups, but the location of the ostia of the cells within the nasal cavity. As a rule, however, the anterior group of ethmoidal cells are not a factor, since a goodly amount of orbital fat, etc., is interposed between the optic nerve and the osseous party wall.

The optic nerve variously crosses the upper and lateral angle of the sphenoidal sinus. In very many cases the thin wall of the sinus is pushed into a moundlike relief by the nerve, so that in a sense the nerve passes thru the sinus, being separated from the lumen merely by the thin osseous wall and the mucous membrane or, where osseous defects exist, only by the mucous membrane (Fig. 4). Indeed, it is very common for the osseous wall over the optic nerve to be so filmy in character, that it is almost a negligible factor as a barrier to prevent the spread of infection from a diseased sinus to the optic nerve. Another type of sinus is that in which the optic nerve crosses

the lateral portion of the roof of the sphenoidal sinus; not infrequently more or less suspended in character (Fig. 7).

The asymmetry of the sphenoidal sinuses may be so great that either the right or the left sinus establishes intimate and vital relationships not only to the great variation in the size, shape and asymmetry of the sinuses and, secondly, to the variation in the distance behind the optic foramen at which the optic commissure is formed (Table 1).

In very large sphenoidal sinuses, especially in the ventrodorsal plane, the optic commissure is located in the

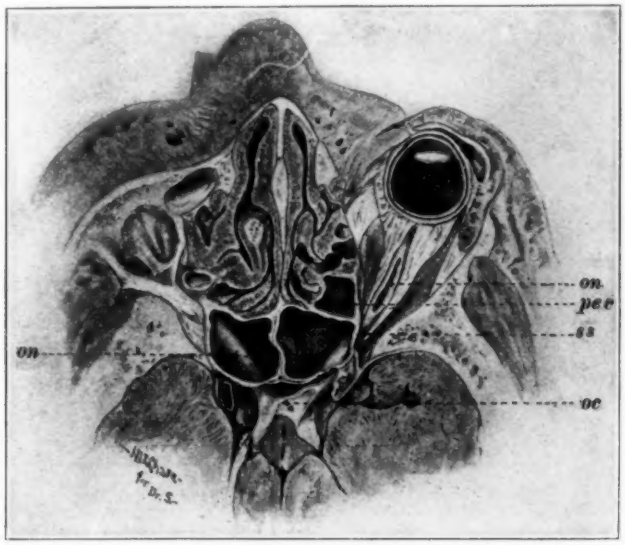

Fig. 7.—Drawing of a cross section exposing the roof of the sphenoidal sinuses. Note the course of the optic nerves. The thin osseous roof of the sinus is pushed into conspicuous relief by the optic nerve. Indeed, at places the osseous wall is defective. This is an extremely common type. *on*, optic nerve; *pec*, posterior ethmoidal cell; *ss*, sphenoidal sinus; *oc*, optic commissure.

with the optic nerve of the same side, but also with the optic nerve of the opposite side. For example, one encounters specimens in which the right sphenoidal sinus comes into actual contact with the right optic nerve, the optic commissure and the left optic nerve; the left sphenoidal sinus being wholly crowded from its usual topographic relationship with the optic nerve of that side (Fig. 8). The opposite anatomy also prevails with equal force. This type would, from an anatomic point of view, explain the bilateral optic neuritis in disease of one sphenoidal sinus; moreover, the escape of the visual pathway should the sphenoidal sinus, not in relationship, be involved.

The optic commissure bears a variable topographic relationship to the paired sphenoidal sinus. The inconstancy of the relationship is due, first, roof of the sinuses, and some distance in advance of the dorsal wall. On the contrary, in smaller sphenoidal sinuses, the optic commissure lies dorsal to the sinuses. When the intracranial segment of the optic nerve is relatively long and the optic commissure formed far dorsad, the commissure rests upon the hypophysis cerebri, and the intimate topographic interrelationship of the optic commissure and the sphenoidal sinuses is thereby precluded (Fig. 9). The location of the optic commissure immediately over the hypophysis cerebri is very common according to the cadavers investigated. It is when the intracranial segment of the optic nerve is short, resulting in the formation of the optic commissure ventral to the location of the hypophysis cerebri in relation to the tuberculum sellae, that the very intimate topographic relationship between the com-

missure and the sphenoidal sinuses is made possible (Fig. 10). Of course, in those cases in which the sphenoidal sinuses extend forward into the ethmoidal mass at the expense of certain posterior ethmoidal cells, the optic commissure is always in the roof of the sphenoidal sinuses.

foramen. As a rule, however, the frontal sinus is not vitally related.

In the vast majority of instances, a goodly amount of orbital fat separates the maxillary sinus from the optic nerve. Rarely, however, when the maxillary sinus pneumatizes beyond the confines of the maxilla into the or-

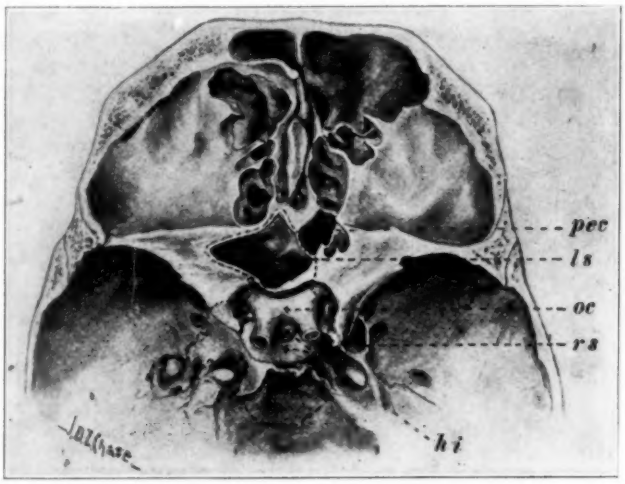

Fig. 8.—Dissection exposing the paranasal sinuses from the intracranial side. Particularly note the great asymmetry of the sphenoidal sinuses and the fact that the left sphenoidal sinus comes into topographic relationship with the left optic nerve, the optic commissure and the right optic nerve. The right sphenoidal sinus is extremely small, and there is no direct relationship to the right optic nerve. This type of specimen is not infrequently encountered. *pec*, posterior ethmoidal cell; *ls*, left sphenoidal sinus (the complete left sphenoidal sinus is indicated by dotted outline); *oc*, optic commissure; *rs*, right sphenoidal sinus; *hi*, hypophysis cerebri and infundibulum.

As stated before for the optic nerve, the asymmetry of the right and left sphenoidal sinuses in the same individual may be so great, that one or the other sinus wholly replaces its fellow as regards topographic relationship with the optic commissure. Indeed, it is not uncommon for either of the sphenoidal sinuses to project so far beyond the midsagittal plane as to establish direct topographic relations with both optic nerves and the optic commissure, the smaller sphenoidal sinus being wholly crowded away. It is, therefore, anatomically possible for a one sided sphenoidal sinus disease to involve equally and at the same time both optic nerves and the optic commissure (Fig. 8).

The frontal sinus, when of the supraorbital type and developed dorsomedially, rarely establishes intimate topographic relationships with the optic nerve in the neighborhood of the optic

bital plate of the palate bone and into the neighboring ethmoidal mass, it may come into rather intimate relationships with the optic nerve, thin bone alone intervening.

The ostium of the sphenoidal sinus is disadvantageously located for good drainage, being placed a goodly distance from the sinus floor. Indeed, in some cases, pus in the sinus would rise almost to the location of the optic foramen before it could escape from the aperture of the sinus into the nasal cavity. Tables 3 and 4 illustrate the variations in the location of the sphenoidal ostium or aperture, and the variation in the distance between the optic nerve and the ostium.

While the ethmoidal cells for the most part have gravity drainage, their ostia not infrequently are of inadequate size and disadvantageously located, so that pathologic states of the mucous membrane readily bring about physiologic closure of the apertures.

TABLE 3.—DISTANCE FROM CENTER OF OSTIUM SPHENOIDALE TO ROOF AND FLOOR OF SINUS.

Side	Distance from Center of Ostium Sphenoidale to Roof of Sinus Mm.	Distance from Center of Ostium Sphenoidale to Floor of Sinus Mm.
Right	12	17
Left	10	13
Right	12	12
Left	12	9
Right	2	3
Left	16	13
Right	2	20
Left	12	17
Right	3	6
Left	12	4
Right	15	17
Left	17	16

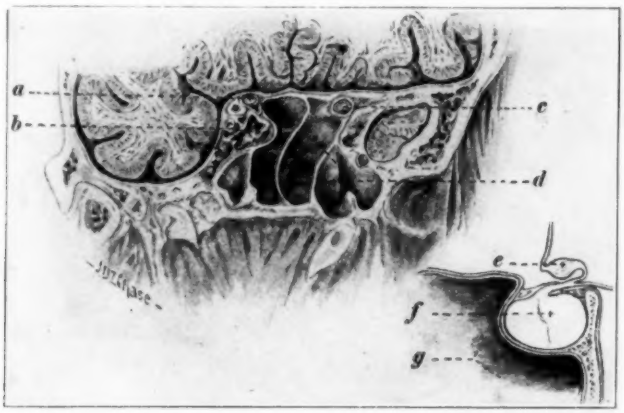

Fig. 9.—Coronal section, exposing the dorsal wall of the sphenoidal sinuses. Particularly note the optic nerves and the lateral recesses of the sphenoidal sinuses. The inset shows the relationship of the optic chiasm to the hypophysis cerebri in this specimen. This type of anatomy precludes intimate topographic interrelations of the optic commissure and the sphenoidal sinus. *a*, optic nerve; *b*, cavernous sinus and contained structures; *c*, optic nerve; *d*, sphenoidal sinus; *e*, optic commissure; *f*, hypophysis cerebri; *g*, sphenoidal sinus.

TABLE 4.—DISTANCE BETWEEN OPTIC NERVE AND OSTIUM SPHENOIDALE

Cadaver	Right Mm.	Left Mm.
A	8	12
B	9	5
C	9	11
D	15	15
E	2	2
F	4	0
G	6	0
H	12	12
I	4	4
J	2 above	1 above
K	3 above	2
L	6	13

COMMENT.

It appears established beyond peradventure that disease of the nose and paranasal sinuses not infrequently leads to various disturbances of vision; indeed, at times to blindness. The problem is not a new one: Onodi and Hanau W. Loeb, particularly, did real constructive work in establishing the topographic interrelations of the optic pathway and the paranasal sinuses. Noteworthy contributions in this subject, in the anatomicoclinical and clinical fields, are those of Bordley, Cushing, Holmes, Knapp, Moritz, Onodi, Packard, Posey, Skillern, Sluder, White and others. Unfortunately, space does not permit a review of the literature in this connection.

Orbital cellulitis and abscess secondary to ethmoidal labyrinth disease is not difficult of comprehension when one recalls the extremely thin, indeed often defective, party walls between the orbit and the ethmoidal cells. The frontal and sphenoidal sinuses, too, frequently have thin orbital walls. The maxillary sinus is said seldom to give rise to orbital abscess. Optic nerve inflammations may or may not result from such orbital conditions. The toxic types of optic neuritis may result from infection of any of the paranasal sinuses, and from conditions elsewhere in the body, the invasion in all probability being by way of the blood stream. Various types of intraocular conditions also result from paranasal sinus disease. Intracranial lesions may involve the visual pathway.

It is, however, not the applied anatomy of the foregoing conditions that concerns us here, but the finer anatomy underlying acute involvement of the sinus portion (vide supra) of the optic nerve and of the optic commissure in disease of the posterior ethmoidal labyrinth and the sphenoidal sinus. Onodi, Loeb, the writer in the foregoing pages and elsewhere, and others

clearly establish the very intimate gross topographic interrelationships of certain of the posterior ethmoidal cells and the sphenoidal sinus, and the visual pathway. As one would expect, many cases of optic nerve involvement secondary to posterior ethmoidal and sphenoidal disease are on record. This is in keeping with the intimate relational anatomy. However, despite the relational anatomy, postethmoidal and sphenoidal infection is common, and optic pathway involvement secondary to it apparently less so.

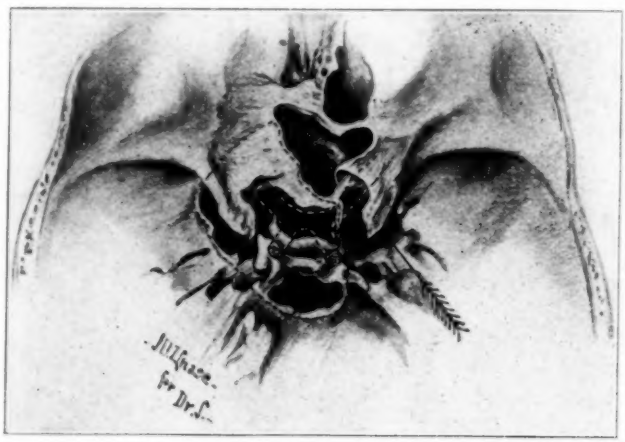

Fig. 10.—In this dissection note that the optic commissure is located ventral to the hypophysis cerebri and over the left sphenoidal sinus. The right sphenoidal sinus, indicated by the arrow, comes into intimate relationship with the right optic nerve, but the optic commissure and the left sphenoidal sinus are related to the left sphenoidal sinus.

Considerable obscurity in the applied anatomy now prevails, and what is needed is a more detailed study of the lymphatic drainage of the accessory nasal sinuses and the tissue spaces about the optic nerve and commissure. Indeed, the finer blood supply of the parts needs further investigation. It is my belief that herein lies the solution of some of the extensions of paranasal sinus disease to the visual pathway.

One naturally wonders why the optic nerve and commissure escape involvement in even some aggravated types of posterior ethmoidal and sphenoidal infection. Why does the optic nerve so readily become involved in some cases of posterior sinus disease? Why is the canalicular segment of the optic nerve apparently a vulnerable point in the optic pathway? Why do some cases of acute optic neuritis and impaired vision clear up so quickly following adequate drainage and treatment of posterior ethmoidal and sphenoidal infections? Why does the optic neuritis in these cases occasionally lead to optic atrophy and blindness? Is there an anatomic explanation for the peculiar changes in the visual field in these cases? Is the optic pathway involvement brought about by infecting planes of contiguous tissue or are the tissue spaces (lymph spaces) and lymphatic networks at fault? Are the toxins or infectious materials brought by the blood stream?

Some of the queries are fairly easy of interpretation, others at present lead us into the realms of hypothesis and speculation. It is obvious that variations in size, shape and type and the asymmetry of the posterior ethmoidal cells and the sphenoidal sinuses are important factors in the inconstancy of clinical manifestations.

In some cases the sinuses in question are comparatively small and the osseous walls relatively thick, or the main pneumatization may not be in the direction of the optic pathway. Involvement of the latter in such cases is less likely. Again, the merest film of bone intervenes between the mucous membrane of the sinuses and the

sheath of the optic nerve, and in case of osseous dehiscences the sinus mucosa is in direct contact with the optic sheath. Infection of the optic nerve in such cases by involvement of contiguous planes of tissue would appear inevitable. In this connection one must not forget the tissue spaces and their relation to the lymphatic capillary network of the sinus mucoperi-

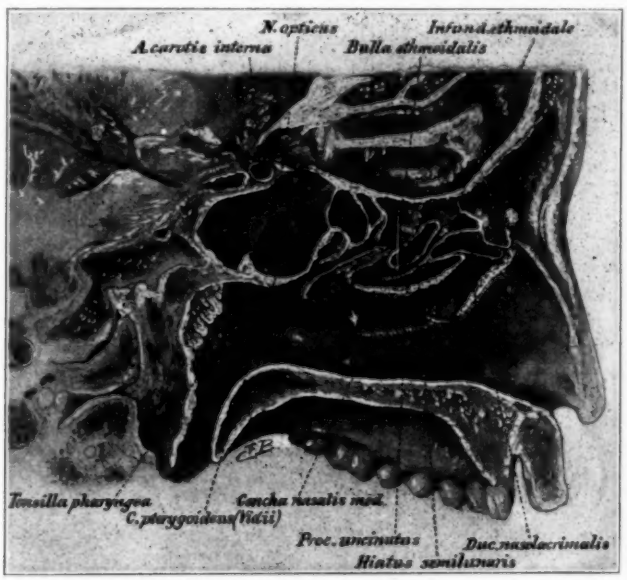

Fig. 11.—Dissection of the lateral wall of the nasal cavity and the nasopharynx of a boy, aged 11 years. It is interesting to note that the optic nerve is exposed for a goodly distance to the sphenoidal sinus.

osteum, on the one hand, and to the meningeal spaces about the optic nerve, on the other. The lymphatics of bone occur in great abundance in the periosteum, and as perivascular spaces penetrate the canals of Havers and Volkmann. In the marrow, perivascular spaces are abundant. The cancellous bone between the compact strata becomes greatly reduced; indeed, at times it is wholly wanting, owing to extreme thinness of the walls of the paranasal sinuses.

Clinically, it would appear that the canalicular segment and the more apical portion of the intraorbital segment of the optic nerve are the most vulnerable of the entire pathway. From an anatomic point of view, one would expect this. These parts of the pathway are almost constantly in very intimate topographic relationship with the most dorsal of the posterior ethmoidal cells and the sphenoidal sinus. It would appear that an edema or swelling of the optic nerve would early lead to pressure on the component neurons in the canalicular segment, owing to the unyieldable osseous canal thru which this portion of the optic pathway courses. Nerve head manifestations, owing to stasis and pressure, would appear certain.

The cell bodies of the neurons in the retina may be intact, but with impairment of some of the fibers of the visual pathway there can be no central registration for such diseased parts. This probably would manifest itself in changes in the visual field. Here one thinks of unequal pressure on the several fascicles composing the optic nerve, pressure affecting the lesser blood supply of the deeper portion of the nerve, or of a selective action of toxins on individual groups of neurons composing the optic nerve. Much study here is needed. In the absence of neurilemma cells there can be no regeneration of atrophied axons within the optic pathway, this despite the fact that the cell bodies of the neurons may

be intact in the retina. Of course, the cell bodies, too, suffer changes.

The optic commissure is less frequently involved, owing in all likelihood to the underlying relational anatomy. In some cases intimate topographic relationship between the commissure and the sphenoidal sinus is precluded by the interposition of the hypophysis cerebri. Again, where

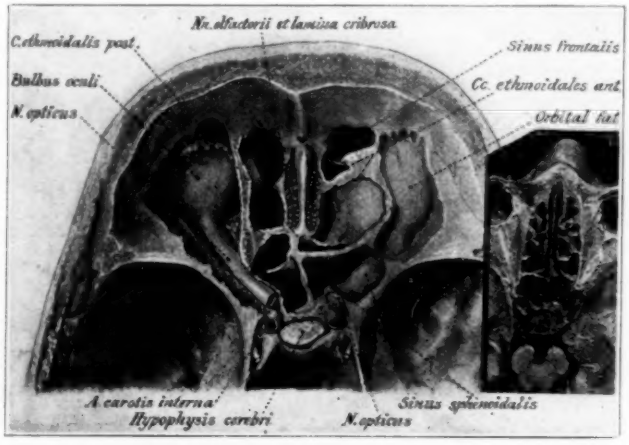

Fig. 12.—Exposure of the paranasal sinuses, orbital tissues, eyeball and optic nerves from the intracranial aspect. Particularly note the relationship of the left optic nerve to the posterior ethmoidal cells and the sphenoidal sinuses. The right optic nerve pushes the lateral wall of the sphenoidal sinus into a conspicuous moundlike relief.

more intimate relationships exist, the intervening bone may happen to be relatively thick. It is, however, very essential to recall that many sphenoidal sinuses come into the most intimate and vital relationship with the optic commissure. Sometimes a single sinus comes in contact with the right and left optic nerves and the whole optic commissure, one of the sinuses being small and wholly crowded aside.

Since some intimately related optic nerves and optic commissures escape involvement in even aggravated types of posterior ethmoidal and sphenoidal infections, and not infrequently fairly marked cases of optic neuritis and changes in the visual field rapidly yield to adequate drainage and treatment of infected posterior ethmoidal cells and sphenoidal sinuses, one cannot help believing that the tissue spaces and the lymphatic system must be the deciding factors. Where the optic pathway escapes in aggravated posterior sinus infection, it is reasonable to assume either that no intimate relations between the parts exist, or, if they do exist, that drainage of the involved sinuses is adequate. Inadequate drainage would lead to great pressure on the mucosa and the contained tissue spaces and the lymphatic capillary network. Is it not reasonable to suppose that there is in these cases a damming back from one tissue space to another or invasion of contiguous spaces, ultimately involving the epidural and other tissue spaces about the intimately related portion of the optic pathway?

The dura mater itself is relatively rich in tissue or lymph spaces which indirectly open into the epidural and subdural spaces. Moreover, the dural tissue spaces proper are continuous with the perivascular and perineural spaces. This seemingly is the way the tissue spaces of the dura mater and epidural and subdural spaces are brought into contiguity with the lymphatic capillary networks of the nose.

The tissue spaces found between the meningeal extensions along the optic nerve are lined with endothelium. These spaces can be injected from the subdural and subarachnoidal spaces of the brain, showing their direct continuity. It has been shown that when a ligature is placed around the optic nerve and its sheath in front of the op-

tic commissure, colored fluid injected into the tissue spaces about the nerve will penetrate into the tissue clefts of the interior of the nerve as far forward as the optic disc. Moreover, the extradural or supravaginal tissue space of the optic nerve communicates ventrally with the interfascial space of Tenon, and dorsally at the apex of the orbit with the subdural space of the cranium. Schwalbe has shown that injection of the subdural space results in the injection of Tenon's space.

The vascular blood system cannot be ignored in this connection: The ophthalmic artery thru its ethmoidal and aberrant branches, and the internal maxillary thru its sphenopalatine and pterygopalatine branches, have to do with the blood supply of the ethmoidal labyrinth and the sphenoidal sinus. Moreover, there is a very definite anastomosis between the terminals of the ethmoidal arteries and those of the sphenopalatine artery. The ultimate distribution to the sinuses in question is effected by capillary networks, which supply the mucoperiosteum and penetrate the osseous walls.

The venous return is accomplished by three main routes; ventrad to the fascial vein, dorsad to the sphenopalatine vein, and cranialward by way of the ethmoidal veins, which open into the superior ophthalmic vein and the superior sagittal sinus. A vein accompanies the anterior ethmoidal artery and empties into venous plexus of the olfactory tract. Since none of the branches of the ophthalmic veins have valves, blood may flow in either direction, e. g., into the cavernous sinus or into the peripheral veins with which the ophthalmic veins anastomose. In the latter connections, one would think of the ethmoidal veins connecting with the veins of the nasal cavity and certain paranasal sinuses, of the branches of origin of the facial vein, and of the large pterygoid venous plexus. Many of the veins with which the ophthalmic veins anastomose are destitute of valves.

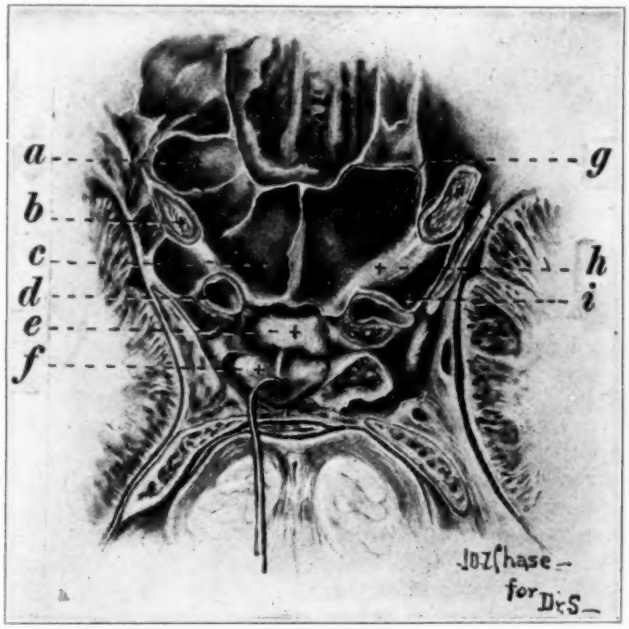

Fig. 13.—Dissection exposing the roof of the sphenoidal sinuses and the course of the optic nerves and optic commissure. The hypophysis cerebri is pulled back so as to expose the optic commissure. The merest film of bone separates the mucous membrane of the sphenoidal sinuses from the optic nerves. *a*, posterior ethmoidal cells; *b*, right optic nerve; *c*, right sphenoidal sinus; *d*, right internal carotid artery; *e*, optic commissure; *f*, hypophysis cerebri; *g*, left sphenoidal sinus; *h*, left optic nerve; *i*, lateral recess of left sphenoidal sinus.

HYPERCHOLESTERINEMIA AND ALBUMINURIC RETINITIS.

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This investigation of the cholesterin content of the blood in cases of chronic nephritis and various ocular conditions was made in the Department of Pathology in the Philadelphia General Hospital.

Few ocular diseases have a pathogenesis so much contested, and still so unexplained as albuminuric retinitis. With no intention of reviewing the voluminous literature of that question, let us recall briefly that the production of the retinal lesions has been variously attributed to a high blood pressure; to local vascular changes; and to modifications in the blood chemistry, as by the retention of urea in the blood stream. In recent years it has become manifest, that the attention of clinicians in internal medicine has been attracted by a belief that the content of the blood in various diseases, particulary chronic nephritis, has become modified by the presence of lipoids, especially cholesterin.

The notion of the importance of cholesterin was introduced into ophthalmology by Chauffard and his disciples. They attributed the origin of gerontoxon, of xanthelasma, and, more recently, of synchisis scintillans, to a condition of hypercholesterinemia. The mechanism of the production of these lesions, as well as of those of retinitis, about which we shall speak presently, may be described somewhat as follows:

At first there is merely an increase of the cholesterin content of the blood —the stage of circulating cholesterin: and later on, cholesterin is deposited in the tissues, then in the skin of the lids producing xanthelasma, in the cornea, gerontoxon; in the vitreous body, synchisis scintillans:—the stage of deposited cholesterin.

In 1911-1912, Chauffard[3-5] reported fourteen cases of albuminuric retinitis, in which he attributed the formation of the white retinal exudates to a hypercholesterinemia. According to Chauffard, the first lesion consists of a fibrinous exudation, in which, on account of the high cholesterin content of the blood, a local deposit of cholesterin speedily follows. giving rise to the typical white spots so common in albuminuric retinitis. Hypercholesterinemia would thus be an early phenomenon of nephritis, which should decrease but not wholly disappear in proportion to the progress of the uremia and the intoxication of the blood. It is therefore in the early stages of the retinitis that the highest hypercholesterinemia ought to be found.

Achard and Feuille, Chauffard, Guy Laroche and Grigaut[4-5], in later papers, confirmed these observations, and in 1920, Chauffard, Laroche and Grigaut published twenty-eight cases of albuminuric retinitis, all of which had exhibited an increase of cholesterin and of urea, together with a heightened blood pressure.

But is not the question of the pathogenesis of albuminuric retinitis twofold? Does it not require, first, the study of the changes in the blood chemistry at the very moment of the production of the lesions, and second, the histochemical examination of the lesions? Such an examination, rather than the first postulant would be likely to give us a more definite solution, if it were not for the imperfection of our histochemical knowledge.

In 1909, previously therefore to the researches to which we have referred, Laubert and Adamück[6] stated, that the white spots of albuminuric retinitis showed the characteristic reactions of the lipoids, viz—double refraction for polarized light; staining black by osmic acid, orange by Sudan II, and pink by Nilblau (Nile blue).

In 1912, Chauffard, Laroche and Fontréault[7], after the microscopic study of a flat extended retina, from a patient who had displayed an albuminuric retinitis and hypercholesterinemia, reached the same conclusions, and in the same year, obtained identic-

al, tho less affirmative results. He was not able to prove conclusively the relative importance of the lipoid containing cells and the extracellular lipoids. "The lipoid cells," he states, "are very small and do not exist in layers thick enough to be ophthalmoscopically perceptible. The white spots of the albuminuric retinitis are of multiple origin, an origin which can not be determined by the ophthalmoscopic examination."

Mawas[9-10], 1913-1916, in a similar work, concluded in a decidedly opposite way. Four lesions, he holds, produce the ophthalmoscopic appearance of the retinitis; the first, the most frequent encountered, and the most important, is a fibrinous exudate on the outer plexiform and the outer cellular layers. Subsequently, in some cases, phagocytosis of this exudation of granular cells ensues; yet, such cells as these are also met with in degenerations of the nervous fibers. They are large and round with a small nucleus, in the protoplasm of which appear, when prepared by the special methods to which we have referred, droplets of lipoids. Yet these lipoids belong to the very nature of the cells, and are not the result of the phagocytosis of the exudation, for Mawas has never been been able to demonstrate cholesterin in the fibrinous exudation itself. Clumps of these special granular cells constitute the only white spots of lipoid origin; they ought, therefore, to be deemed a late and casual phenomenon in the course of albuminuric retinitis. His conclusion, accordingly, is in absolute contradiction with the ideas of Chauffard, who regards the deposits of cholesterin as constituting the initial and the primordial phenomenon of the retinitis. The third lesion is a detachment of the external limiting membrane, which gives rise to the ophthalmoscopic appearance of large opalescent areas.

Finally, there sometimes ensues a gangliform degeneration of the nerve fiber layer, which becomes manifest as small white patches.

The two last lesions are rare and are of less importance than the other lesions present. The study of the histologic lesions, as can be seen, has contributed but little to solve the problem.

I undertook my study with the intention of reconsidering the researches of Chauffard, from a more intimate ophthalmologic standpoint than he has implied, but especially to determine the relations existing between hypercholesterinemia and the various forms of retinal exudates; and to detect, if possible, the coincidence of the initial appearance of the white spots and the onset of an increase in the cholesterin content. My researches have given me very different results from what I had expected.

Methods: I have adopted for the determination of the cholesterin content of the blood, the colorimetric method described by V. C. Myers, and Wardell[11], in 1918. I refer the reader, inquiring for technical details, to the original paper of these authors. I will, however, briefly summarize the method.

1 cc. of blood is intimately mixed with about 4 grms. of plaster of Paris. This mixture is dried for one hour in an oven, at 90° C., and its cholesterol content is extracted by boiling chloroform. The extract obtained and a previously prepared standard chloroformic solution of cholesterin are then subjected to the Liebermann-Burchard staining reaction; that is to say, when acetic anhydrid and sulfuric acid are combined in the presence of cholesterin, a blue-green color is produced, the depth of the color depending on the concentration of the solution. These two solutions are put in a colorimeter and their comparative cholesterol content is determined.

I adopted this method because of its simplicity and clinical accuracy. Myers and Wardell submitted their method to comparative tests with the Windhaus, and the digitonin-gravimetric methods, and their results were in full accord.

I frequently reassured myself of the completeness of the extraction of the cholesterin by submitting the last chloroform extraction to the coloring

reaction, to verify that it remained colorless.

I employed total blood, kept in oxalated tubes. The amount of cholesterin in total blood is slightly less than that of serum; according to Myers, the content varies between 120 and 170 mgrs. per 100 cc. In order to verify this statement, and also to determine the value of the personal element in this research, I undertook a series of tests on subjects suffering from diseases in which the cholesterin is not disturbed. Table 1 shows the lowest content at 120, the highest, 170. I, therefore, am justified in considering every blood in which the content is above 170, to be hypercholesterinemic.

Table I

Nephritis with hypercholesterinemia, but without retinitis.

Clinical diagnosis	Blood pressure systole	Blood pressure diastole	Urea mgr. 100 c.c.	Cholesterol mgr. 100 c.c.
1. Chronic nephritis	150	90	42	220
2. Chronic nephritis	130	70	27	420
3. Chronic nephritis	115	75	24	292
4. Chronic nephritis	210	110	103	192
5. Chronic nephritis	140	80	183	190
6. Chronic nephritis	125	20	75	180
7. Chronic nephritis	180	90	120	230
8. Chronic nephritis	230	140	94	190

The urea of the total blood was measured with the urease method. The numbers, in the tables, give the content in urea, not in nitrogen.

I would add I did not select my cases of retinitis. The studies were made on the patients as they fell under observation in the clinics and hospitals of Philadelphia.

RESULTS. I have divided the cases into sections which are arranged in three tables. Table 2 includes nephritis with hypercholesterinemia without retinitis. Table 3, albuminuric retinitis without cholesterinemia; and Table 4, those with hypercholesterinemia.

Table II
Controls

Clinical diagnosis	Cholesterol mgr. p. 100 c.c.
1. Central choroiditis	140
2. Thrombosis branch central vein	155
3. Phlyctenular Keratoconjunctivitis	120
4. Atrophy papillomacular bundle	165
5. Chronic urethritis	150
6. Chronic urethritis	150
7. Chronic urethritis	145
8. Chronic urethritis	170
9. Chronic urethritis	155
10. Luetic chancre	160

TABLE III

Albuminuric retinitis without cholesterinemia.

Ophthalmoscopic examination.	Blood tension systole	Blood tension diastole	Urea mgr. 100 c.c.	Cholesterol mgr. 100 c.c.
1. Edema of disc and retina; hemorrhages; dirty greyish exudates	215	165	56	150
2. Retinal edema; hemorrhages; edematous exudates	260	120	62	130
3. Edema of disc and retina; white, yellowish exudates; hemorrhages	290	135	47	125
4. Neuroretinitis; hemorrhages; white exudates; partial macular star shaped figures	235	140	46	130
5. R. Obstruction central artery; L. Edema and choked disc; white exudates; hemorrhages; star shaped macular figures	Unavailable		94	140
6. Edema retina and disc; small hemorrhages; punctate, grey exudates; yellowish and white exudates	150	120	73	140
7. Small white exudates surrounding disc	200	130	Unavailable	115
8. Old retinitis; pronounced arteriosclerosis; hemorrhages; dirty greyish exudates	160	80	80	160
9. Edema of disc and retina; small hemorrhages; white yellowish exudates; edematous exudates	205	110	77	150
10. Edema of retina and disc; hemorrhages; white yellowish exudates	200	110	47	160
11. Edema of disc and retina; hemorrhages; small yellowish exudates	170	115	280	145

TABLE IV

Albuminuric retinitis with hypercholesterinemia.

Ophthalmoscopic examination.	Blood pressure systole	Blood pressure diastole	Urea mgr. 100 c.c.	Cholesterol mgr. 100 c.c.
1. Edema of retina and disc; yellowish exudates; vascular lesions	220	145	88	232
2. Edema retina; hemorrhages; white exudates	260	200	68	240
3. Edema of retina and disc; hemorrhages; white exudates	260	120	24	175
4. Edema of retina and disc; hemorrhages; white exudates; starshape macular figures	270	120	193	180
5. Numerous hemorrhages; white and yellow exudates; synchisis scintillans	205	140	75	220
6. Edema of disc and retina; white and yellowish exudates surrounding retina	170	85	60	220
7. Neuroretinitis (old); yellow exudates	260	200	20	180

We may consider the possible relations between cholesterinemia and albuminuric retinitis according to the following hypotheses:

1. Cholesterin as the direct cause of the retinitis; when in excess in the blood it produces lipoid deposits in the fibrinous retinal exudates and gives rise to the socalled white spots of albuminuric retinitis.

II. The association of retinitis with hypercholesterinemia arises without hypercholesterinemia as the cause of the retinitis, for both are manifestations of the same disease, the result of a common pathologic disturbance. The presence of cholesterin, therefore, would be only a concomitant of the retinitis. And III. There is no connection between the two conditions.

An inspection of Tables III and IV will show that in 18 cases of retinitis, 11 did not display hypercholesterinemia.

In Table III, 3, 6, 7, 8, 10, relate to early cases of retinitis, disclosed by the clinical histories and the ophthalmoscopic examinations. Altho these displayed typical white spots, all of the patients had normal cholesterinemia. Case 6 was particularly interesting, because we were able to follow very accurately the course of the disease. When first examined the fundi presented edema of the discs and of the surrounding parts, together with a few small patches of exudate, some of which were grey and could hardly be differentiated from the fundus; other patches were more clear, while some were bright white. A few weeks later, one distinctly larger and brighter white exudate was seen to have been formed near the margin of the disc. Despite this formation of exudate, the cholesterin content of the blood remained normal—140.

Case 10 exhibited the same characteristics. At the ophthalmoscopic examination, a beginning neuroretinitis without exudates was discovered. Four weeks later we saw a yellowish white exudate along the disc margin. At the time of each examination the cholesterin content was normal—160.

Notwithstanding the presence of active retinitis, in two of which there were displayed macular, star shaped figures, none of the other cases of this table showed hypercholesterinemia. It would seem to me, therefore, very difficult to ascribe to cholesterin the primary and essential part in the genesis of the exudate in albuminuric retinitis. Because I did not see constantly present any one particular form, I deem it erroneous to speak of any single type of exudate as characteristic of albuminuric retinitis. Between the dirty greyish edematous spots and the bright white exudate, we found every intermediate stage. Furthermore, ophthalmoscopic appearances regarded as characteristic of albuminuric, or, of diabetic retinitis, such as the star shape figures, have been found in various other diseases, as in erysipelas and syphilis, or in the course of choked disc, papilledema. It is more than likely that the retina reacts similarly to the influences of various diverse pathologic excitations, just as a variety of infections can produce a pseudomembranous conjunctivitis.

We have to consider the hypothesis in which hypercholesterinemia appears without being the cause of retinitis. This, in my opinion, is very unlikely, because of 18 cases of retinitis, only 7 showed hypercholesterinemia, altho there was manifested high blood pressure as well as the presence of uremia.

In addition, Table II shows, that in so small a total as 16, 8 cases of chronic nephritis without retinitis were found, yet in these the amount of cholesterin was above the normal, sometimes very greatly. It would have been possible for me to have observed a much larger number of individuals, but I deem the group here considered to be sufficient to demonstrate that hypercholesterinemia in chronic nephritis can exist without retinitis.

I accordingly am compelled to accept the third hypothesis. Therefore, inasmuch as more than half of my cases of albuminuric retinitis did not have hypercholesterinemia, and as those which showed it had also either uremia or a

high blood pressure, if not both; and as a number of chronic cases with hypercholesterinemia did not have retinitis, I believe that there is no definite relation between hypercholesterinemia and albuminuric retinitis.

In this discussion it has been my intention to consider the pathogenesis of albuminuric retinitis from other standpoints. It may be apropos to remark upon certain interesting coincidences which I observed. All of the cases of retinitis showed either high blood pressure or an increase of the blood urea; however, too much importance must not be attributed to the number of cases because of the possibility of the influence likely to be exercised by rest in bed, diet, etc.

Certain cases with normal or subnormal blood pressure were in a state of disturbed cardiac compensation and had exhibited increased pressure at some time in the course of the disease. I was much interested in observing that out of 18 cases of retinitis, 13 had high blood tension (more than 200 mm. of Hg.); and among 8 cases of nephritis, without retinitis, only 2 showed a blood pressure above normal. Five had more or less pronounced uremia, and of the 18 cases of retinitis, 12 had more than 50 mgrs. of urea per 100 cc.

Conclusions. 1. There seems to be no relation between hypercholesterinemia and the formation of the exudates of albuminuric retinitis.

2. No coincidence seems to exist between the presence of hypercholesterinemia and albuminuric retinitis.

3. Albuminuric retinitis is always accompanied by either high blood pressure or by uremia, or by both.

Before closing this report, I wish to thank Dr. Edward B. Krumbhaar, Chief of the Department of Pathology, of the Philadelphia General Hospital, for the generous hospitality that he gave me in his superb laboratories. The advice of Dr. W. H. Stoner, of the laboratory of Biochemistry, of the same department, was most valuable for the technical part of these researches. And, I wish to express my sincere appreciation to Dr. Burton Chance of Philadelphia, for his kindness in revising the translation of this paper.

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VARIOLOUS INFLAMMATION OF THE CORNEA.

G. HERBERT BURNHAM, M.D., F.R.C.S., EDIN.

TORONTO, CANADA.

This paper reports a case followed by very satisfactory clearing of the cornea under the treatment including mercury, iodids and pilocarpin.

In June 1919, a young man, aged 33 years, was referred to me by Dr. McKay of Oshawa, for his right eye, which had become inflamed during an attack of smallpox two months ago. The left eye was unaffected. There was a large dense infiltration of the cornea, occupying the outer half and so much of the inner, that I could just see enough of the iris at the extreme inner edge of the cornea, to make out that the pupil was apparently fully dilated in this direction with the atropin, which had been used prior to seeing me. The vision was light perception only, except in one part of the field, where large objects could just be made out.

There was, tho the infiltration was apparently free from any active inflammation, an irritable state and photophobia, for which I could not satisfactorily account.

I decided to use "The Combined Treatment" without delay. The first series is always twenty hypodermic injections of pilocarpin, given daily so as to get the system under the full influence. The subsequent series are each ten injections in number, and these are given at intervals of five, six, or seven weeks, so as to keep up the full effect of the drug. If the case is very urgent, the interval is four weeks, and sometimes the first series is thirty in number.

During the series of injections I give internally, twice daily, mercury and the iodid of soda, if the patient can bear them, as sometimes they are not borne. But between the series, the medicine is always given thrice daily. The strength of the injection used in this case varied from gr. 1/8 to gr. 1/3. The first dose may even be gr. 1/12 so as to feel the general system as to any peculiarities it may have. If any dose seems to cause too much reaction, a smaller one may then be given.

This so called excessive reaction seems to be due to the inability of one or more of the organs of the body, for example the liver, to bear the sudden call upon it to decidedly increased functional activity, and hence vomiting and sometimes distress. A little later in the same series, a larger dose gives rise to no such symptoms. This remark applies to the other organs, the heart included. A sharp pain or cramps of short duration, and even slight shivering, may occur. These are entirely due to the heightened functional activity, are noninflammatory, and harmless.

The use of the treatment is often accompanied with no disturbance, whatsoever. The maximum effect must be kept up, and this can be done without any danger or even much inconvenience, if one is accustomed to the administration of the drug. The muriat of pilocarpin is more effective, and is now used by me to the exclusion of nitrat. In this case I had given as much as gr. 1/3; but not often, as the action thru the nervous system showed that it was advisable not to do so.

He returned again in August to receive a series of ten injections. I examined the eye carefully, as I always do before beginning a series. There was a decided clearing of the infiltration, but I could see there three fuzzy white spots, evidently the center of a certain active condition, and the cause of the irritation, mentioned in the beginning.

My patient again appeared in October, just prior to another series of ten injections. A marked improvement had occurred. The vision was 6/18.

At the end of November, when he again came up for another series of ten injections, I examined him and found the condition as follows: Without

mydriatic the vision was R. +1.00 cyl., 6/9; L. +1.00 cyl., 6/6 easily. With a mydriatic, vision was R. +0.25 sp.⌒ +1.00 cyl.=6/6 slowly; L. +0.25 sp. ⌒+1.00 cyl.=6/6. Glasses were ordered.

In January 1920, he again came to see me, that is about seven weeks after the last series. With undilated pupil the vision was with glasses R.=6/9.

As the eye looked so well and the slight corneal haze, tho still present, was not visible to an ordinary onlooker, he decided to cease the treatment. I remarked, that if another series of ten injections were given, the haze would disappear, and the vision be as good as that of the other eye; that is normal. His general health was excellent, and he had gained ten pounds in weight.

January 1921—this is the first visit since January 1920. There is still a slight haze of the cornea, and the eye is quiet. The vision is R. +1.50 cyl. =6/9 and a few letters of 6/6; L. vision as before.

I now reminded him of my former advice, and that had he but taken it the vision would now have been normal. I have brought this case to your notice as corneal inflammation, due to smallpox, is now so rarely seen.

Speaking in a general way in regard to corneal ulceration and corneal inflammation of a severe type, which type alone tests the respective merits and the superiority of any form of treatment, I can affirm, without hesitation, that the "Combined Treatment" has been, in my hands, very successful, and is to be relied upon. It not only heals, but also clears the corneal tissues involved so that good vision is given. Even when causing the greatest effect, its action is always physiologic, and therefore unattended with any ill effects, either in regard to the eye or the system generally, that is, doing away with the fear of any injurious action upon the eye during its use. This is a statement, a contention, which my long experience has markedly verified.

My patients also show in addition to the great improvement of the local disease (very many times a cure) a greatly bettered general condition, so often evidenced by that sure sign, viz., a cleared and healthier look to the skin, or as a lay person would express it, a better complexion.

The superactivity of the nerve centers of the whole nervous system, but especially of the diseased tissues, produced by the use of the "Combined Treatment," has always been the hypothesis upon which I have reasoned and worked. This hyperactivity causes such a sustained and decided increase of the physiologic circulation of the affected tissues, that the germs of the disease are overwhelmed and destroyed, and thus there are brought about a decidedly improved condition and often an apparently normal state.

This is the manner of action of the so called "spontaneous" cure. The term physiologic circulation is one which includes all the means used in the economy of the body to nourish any normal tissue. The "Combined Treatment," as well as having the power of exciting this hyperactivity of the physiologic circulation, has also this naturally associated effect, in that it seems never to cause other than an activity, which gives rise to no abnormal state of the tissues. In other words this superactivity is always a heightened normal condition, tending towards what may be termed almost perfect health.

At times, while the eye affection is being treated by this remedy, this treatment has also most beneficially acted upon a long standing and obstinate skin disease, as eczema. It is a legitimate outcome and a support of my hypothesis with respect to the "Combined Treatment."

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NOTES, CASES AND INSTRUMENTS

SYMMETRIC CYSTIC ENLARGEMENT OF THE LACRIMAL GLANDS DUE TO SYPHILIS.

H. W. Cowper, M.D., F.A.C.S.

BUFFALO, N. Y.

An Italian, age about 50, entered the General Hospital because of the tumors shown in the accompanying photograph. That on the left side began eighteen months previously. On the right side about nine months.

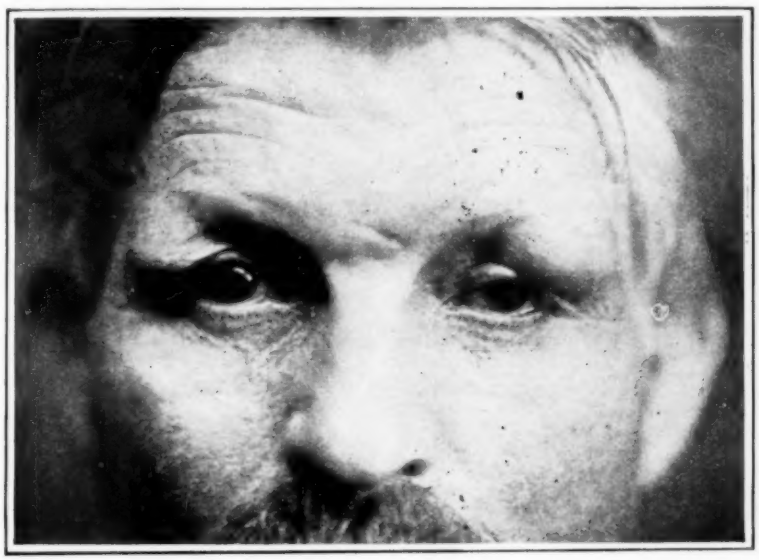


Fig. 1. Enlargement of lacrimal glands due to syphilis. Cowper's case.

There had been a steady slow increase in size. No pain or other discomfort had been experienced. The tumors were cystic and passed under the orbital ridge. There was no tenderness or redness. None of the neighboring lymphatics was enlarged. He came to the hospital for operation and several who saw him thought operation the proper procedure. The Wassermann was positive. Three or four weeks after one injection of arsphenamin, the swellings had entirely disappeared.

Such cases are seen very infrequently. This one is therefore worth recording.

PHYSIOLOGIC HYALOID ARTERY REMNANTS.

Robert Von Der Heydt, M. D.

CHICAGO, ILL.

Read before the Chicago Ophthalmological Society, October 24, 1921.

When remnants of the hyaloid artery are seen, by focal illumination with the ophthalmoscope, they are considered persistent in the sense that nature has not fully completed their absorption in the normal manner. Very decided cases of this kind, as is well known, are often associated with various other congenital ocular malformations.

The hyaloid artery is carried forward to its expansion on the posterior capsular surface of the lens in the third month of fetal life. At birth, according to Parsons, the whole of the vitreous lental system of blood vessels has become absorbed and has disappeared. That this is not quite true has now been disclosed by the Gullstrand slit lamp in conjunction with the binocular microscope, when observing the living eye.

A very large percentage of normal eyes show a long spiral formed vessel remnant, attached somewhat nasally and downward from the lens center on the posterior capsule. This physiologic remnant hangs downward, in the now definitely discernible, optically empty, posterior lental space, first described by Berger. This space, as may be easily observed is quite a large and

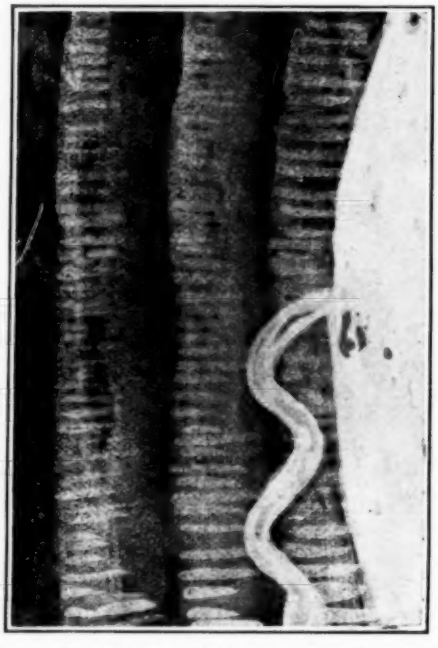


Fig. 1. Physiologic hyaloid remnants. Seen with corneal microscope by slit lamp illumination.

deep one, not as is mentioned by Salzmann, a "capillary slit." On motion of the eyeball the lower free end of the spiral remnant is seen to gyrate or swing freely. At times the spiral elongates to quite a degree during this movement.

That we are dealing with the physiologically natural disposition of this remnant, and not with an occasionally pathologic persistence of this vessel structure, is now certain. First of all, there is found a uniformity in thickness. Secondly, the great number of instances where these structures were found in normal eyes absolutely excludes their presence as being a chance finding. I have seen at least fifty instances in youthful individuals, where the pupils were dilated incidental to refraction, in my office practice within the last year.

There can be no doubt that this delicate structure is destroyed in the process of fixation and hardening, incidental to the preparation of specimens for histologic examination. Other structures that do not withstand this process of preparation have been observed in great numbers, by examination of the living eye with the slit lamp under high magnification. Among these it is interesting to mention the various types of vacuole formation within the lens structure and subcapsular in location, and the physiologic and pathologic dew like changes in the cornea. We commonly find star shaped pigmented remnants of the pupillary membrane on the anterior capsule, and exceedingly often delicate cotton and spider web like remnants, attached to the iris and floating with free ends in the aqueous. These latter are found in about one-third of all eyes, tho not as frequently in old age. I also wish to mention in this connection the great variety of other vascular remnants, hitherto unrecognized, which are now disclosed on all posterior capsules by the slit lamp.

Why do we find these remains of the hyaloid artery in some eyes and not in others? Why, when found, are they always bilateral?

There are several factors which I think predispose to their finding final lodgment in the postlental space. First we must assume that in order to make their appearance within this space, a comparatively central or more posterior severance of this vessel must occur. This is proven for when found they are all quite long.

It seems quite likely that during the growth of the eyeball the vessel remnant is drawn taut. At the time of rupture, for this reason, it is projected toward the lens. This tension seemingly also accounts for the spiral and curled up form always assumed by the hyaloid artery remnant.

If the point of separation is anterior and there be space present within the posterior canal, the longer end may for the same reason normally gravitate toward the nerve head attachment; where I anticipate it may be found in many cases, were we to succeed in better observation and penetration by focal light into this area. It must however be remembered that in this area the increased reflection from the retina and luminous nerve head may be sufficient to obscure this delicate structure. In the anterior situation behind the lens, it is only visible when under direct focal illumination.

I also presume a patency of the canal of Cloquet is necessary for a successful gravitation, the normally variable fluidity of the vitreous within certain limitations would not be a factor favoring its appearance or absence, except that possibly its swaying motion may aid dislodgment.

In order to expect to find the artery remnant posterior to the lens, it therefore is necessary that a somewhat posterior separation occur and the canal be open and free to admit of its gravitation. I am finally of the opinion that a certain position of the fetal head in utero, which favors its gravitation toward the postlental space, at the time of the splitting of this vessel remnant, is a third and important factor which may contribute toward the creation of this new and interesting histologic finding.

DETERMINING THE MUSCLE POWER.

OTTO WIPPER, M.D.

CHICAGO, ILL.

As yet no method for testing the power of the extrinsic muscles has been accepted as a standard.

My suggestion would be to discard the prism test, in which the muscle power is measured by the highest prism with which the patient can overcome diplopia.

I would advocate a method that more or less amounts to taking the field of fixation. Instead of convergence and divergence the terms adduction, abduction, etc., should be employed.

If reference is made to the power of convergence, it should be expressed in meter angles.

The power of divergence, as determined by prisms, is an entirely negative and abnormal matter, and must be considered worthless; we simply cause a disturbance in the associate movements of convergence.

The only normal divergence consists in the return from convergence to the position of rest, the slight angle gamma divergence also being a normal condition.

The test for the vertical excursions is equally worthless when prisms are used, for here again we are trying to determine something that has no relation to a normal function, by disturbing the associate movements of parallelism.

For the determination of the power of convergence the prisms are less objectionable, because we are at least dealing with a function for which the eyes are adapted, but it is by no means a satisfactory method. A child, about ten years of age, having a high amplitude of accommodation and a somewhat corresponding convergence, will naturally converge the most; yet, when adjusted for distance the child will overcome less prism than the adult; while the adult's accommodation has gone down, his faculties of fusion and observation are more developed, and so is the muscle power.

When the refractive normal eyes are fixed for distance, the convergence as well as the accommodation are at rest; there will be a slight divergence due to the angle gamma. The binocular movements, in general, are divided into the associate movements of convergence and the associate movements of parallelism. To a greater extent both these movements are again associated.

If we adopt a method similar to the one used in taking the field of fixation, I think that the perimeter would make

a suitable apparatus; the eye to be tested should be placed in the center and its fellow be covered.

One might infer that this could be accepted for measuring the adduction, tho not for the other excursions, because accommodation and convergence are then stimulated. But we all have a perimeter and our main object in view is to establish a standard. On the other hand, it is rather difficult to obtain the required diagrams at six meter distance; I am sure that the faults of such a method would be little as compared to the ones of the prism test.

The prism test for heterophoria is ideal, and nobody considers the system of recording the phoria wrong, for we know that five degrees for distance or near means that it takes a five prism to bring the images in line, altho the actual phoria is only about two and one-half degrees, the angle of deviation being half the angle of refraction; the method is simply standardized and it is satisfactory.

Whatever method is adopted, let us stop trying to determine muscle functions which bear no relation to the normal. There is a marked difference between abduction and divergence; in normal binocular vision, the pupillary distance does not increase from that of the state of rest, nor does the pupilliary line change as brought out by placing a prism base up or down.

SUBJECTIVE OCULAR EXPERIENCES.

EDWARD J. BROWN, M.D.

MINNEAPOLIS, MINN.

Some forty years ago, on a cold winter night, while bridling my horse in a dark stable, my spectacles were knocked off and lost. My drive home was ten miles, and the following day my eyes became painful and for some days I suffered with a sharp conjunctivitis. To ease my discomfort several doses of deodorized tinctur of opium were taken, with the result that I lay for hours with a constant panorama of the most delightful kaleidoscopic colors passing before my closed eyes. This experience gave me a suggestion of the seductive dangers of the opium habit which influenced my whole professional life, with the result that no habitue has ever been able to charge me with responsibility for his misfortune.

In the summer of 1919, as a result of a cold morning ride with insufficient protection, I had a severe colon bacillus cystitis and ascending pyelitis, with a white blood count of 24,000, freedom from pain, but a weariness that was more distressing than pain. Vision was very dim but my friend, Dr. Charles Nelson Spratt, could find no objective indications of involvement of either retina or optic nerve. For two weeks or more, my waking hours were largely spent in the contemplation of the most wonderful visions of kaleidoscopic colors, geometric forms and one particular image which impressed me as being the person of Genghis Khan. This image included that of a magnificent charger, clad in armor, the feet stamping, the jaws clamping the bits and the eyes flashing.

A few days since on waking in the morning after a good night's rest, following a rather rich supper, I turned quickly from my left side to the right, and on opening my eyes found the windows and objects in the room rapidly passing to the left. This was partly relieved by turning back to the left and closing the eyes. A soap enema, a late breakfast of coffee and toast, and the trouble disappeared.

As I was writing this, an old friend, himself for some years an opium habitue, made such by the unwise administration of hypodermics by a physician for hemoptysis, and with a large experience in the treatment of habitues, came in and told me that the kaleidoscopic images and the beautiful dreams of De Quincy are never experienced except with the small and early doses.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

November 21, 1921.

DR. EPHRAIM K. FINDLAY, PRESIDENT.

Operation for Drawn up Pupil.

DR. WILLIAM A. FISHER showed results of lowering the pupil by the Smith method. After a capsulotomy operation, the pupil was drawn up into the scar tissue which prevented the patient from seeing. There was no reaction following this operation.

Leontiasis Ossei.

DR. GEORGE F. SUKER presented two men, in the sixties, showing changes of leontiasis in the cranial bones, involving the orbits (photographs and X-ray plates shown), and implicating the optic nerves, producing a choked disc with the secondary atrophy in three eyes. In both cases a divergent strabismus resulted from the encroachment in the orbit by spongy bone along the inner walls, characteristic of leontiasis. In addition there was a pronounced proptosis of the two eyes. Upon a radical removal of this spongy bone, the eyeballs receded, the divergence practically disappeared and also the choked disc, but necessarily not the atrophy. Roentgenograms of other parts of the skeleton showed but a moderate leontiasis of one tibia and fibula in each patient. One patient was still living, the other died because of the excessive process involving the sphenoid in the region of the sella.

Patent Hyaloid Artery.

DR. SUKER presented a patient in whose left eye was such a vessel with fimbriated terminal convolutions, accompanied by minute hemorrhages into the vitreous on various occasions. Vision in the eye was normal when no hemorrhages were present. These occurred after violent or strenuous physical exertion. Blood pressure was normal; no tuberculosis; no syphilis present. Patient, a dentist, 38 years of age.

A Migrain Patient; Serous Meningitis.

DR. SUKER stated this patient had a serous meningitis (Quincke's type) 14 months ago accompanied by a marked bilateral choked disc. Vision in each eye now with low myopic astigmic correction 20/16. Fields for form and color concentrically contracted. At present he showed moderate secondary optic atrophy in each eye. He had a return of the serous meningitis with the reappearance of the choked discs, and after convalescence vision again was normal and fields the same as after the first attack. Being a migrain patient, with marked gastric disturbance, and these choked discs, it was thought by several, who had not recognized the Quincke's type of serous meningitis, that he had a brain tumor. No focal brain tumor symptoms could be elicited, but the classic characteristics of a Quincke's meningitis were very pronounced. The patient was an ex-soldier of exemplary habits, no lues, but had arrested pulmonary tuberculosis.

Pterygium Surgery.

DR. MICHAEL GOLDENBURG read a paper on this subject, which will be published in full in this JOURNAL.

DISCUSSION. Dr. Clark W. Hawley said that for something like thirty years he had seen a good many of these cases operated on by what was called the McReynolds' method. This was a misnomer. McReynolds simply made the operation popular. It was an old French operation. He had never seen an extensive case of pterygium that was treated by that operation where the cosmetic effect was good, for the reason that one left a large corneal scar and Nature would cover this rapidly by an extension of the epithelial layer of the conjunctiva

over the scar. If one took a pterygium where it extended to the center of the cornea and desired an absolutely clear cornea, it was necessary to do transplantation with Thiersch grafts, the object being to get some bridge between the pterygium and the scar on the cornea. The graft should be the thinnest possible piece of skin which might come from the mastoid if free from hair.

Dr. Goldenburg, in closing, said he was not familiar with the procedure described by Dr. Hawley. It had not been his good fortune to do any kind of surgery on the cornea where he destroyed Bowman's membrane or the cornea proper without leaving scar tissue.

The procedure he had presented was very simple. Its only advantage over the McReynolds' operation was that it removed the foreign body in the lower culdesac, brought it outside, and the eye showed hardly any reaction. After six months or a year, one could hardly tell where the eye had been operated on.

Cataract Operations Performed by Colonel Smith.

Dr. Ephraim K. Findlay stated that on the 28th of May, 1921, Lieut.-Col. Smith of Amritsar, India, operated at the Illinois Charitable Eye and Ear Infirmary on 13 cases of senile cataract, performing bilateral operations on 2 cases, making in all 15 cataract extractions. The average age of the patients was 62 1/2 years, the oldest being 81, and the youngest 43 years. All cases had good light perception and projection with clean laboratory records, except a few isolated colonies of staphylococci from the conjunctival sac of 3 of the patients.

The preparation and after treatment followed as closely as possible the directions given by Colonel Smith. The intracapsular extraction was performed in all cases except one, where the capsule ruptured before delivery. In one case only was there loss of vitreous at the time of extraction, and that in an uncontrollable patient who squeezed violently during the operation.

Four of the cases resulted in total failures from the following causes:

Case 1 had a vomiting spell after a fit of coughing the day after operation, with choroidal hemorrhage and expulsion of the vitreous and total loss of sight.

Case 2. Patient squeezed during the operation. Vitreous was lost and a severe iridocyclitis followed, with iris drawn up and the pupil occluded, so that vision was reduced to shadows.

Case 3. Patient tore the bandages off the third day and in the after treatment was difficult to control. A severe iridocyclitis followed, resulting in blindness.

Case 4. Patient had iridocyclitis; pupil was drawn up to the wound. Fine floating bodies were found in the vitreous and vision was reduced to 20/150, which no lens would improve.

The other cases after refraction gave the following visual results: One 20/20; four 20/25; one 20/40; three 20/50; two 20/65.

In percentage this would read:

Good results 20/30 or better..33.3%
Fair results 20/40 to 20/50...26.6%
Vision of 20/65.....13.3%
Failure 26.6%

Eliminating the first four cases, in the remaining 11, 6 had iridocyclitis of varying degrees of severity, with incarceration of the pillars of the iris in the wound, making a percentage of 54.5. The length of time in the hospital after the operation varied greatly, and some of the cases were retained for an operation on the second eye. Some were retained long enough so that satisfactory refraction could be made and the reports completed, as many of the patients when dismissed never returned. The average convalescing period from the other methods of operation was certainly not lessened.

In summing up as far as possible from such a limited number of cases, no definite conclusions could be drawn. The results did not show an improvement in visual result over capsular operations. The inflamma-

tory reaction was as great, if not greater, as there was more trauma.

The cosmetic result from such a large iridectomy was far from satisfactory. The claim that when the lens was removed in the capsule there was less danger of iridocyclitis had not been proven in these cases, as 54.5 per cent of iridocyclitis was a large per centage. Altho these operations were performed by a skilled master in the technic of intracapsular extractions, the results had not proven as satisfactory as the older methods of operations.

Dr. W. A. Fisher stated that on May 26, 1921, at the Chicago Eye and Ear Hospital, Col. Smith performed 16 intracapsular cataract operations on 15 patients, one of them having both eyes operated upon. The oldest patient was 85, youngest 47, and the average age 65. The longest time in the hospital was 25 days, shortest time 10 days, and the average time 14 1/2 days.

The visual results of 16 cataract operations performed by any method would not be considered a sufficient number to recommend or condemn the method. Smith was fortunate in some respects and unfortunate in others. Fortunate in having only one case with poor vision due to fundus lesion. Unfortunate in having a case of hemorrhage of the choroid, especially when it occurred only once in about 250 operations.

The visual results reported were from records received from the doctors who referred the cases, and were made about six weeks after the operations.

	Age.	Vision.	In Hospital.	Complications.
1. O. S. J.	56	R. E. 20/10	15 days	None.
2. L. A.	78	L. E. 20/15	19 days	None.
3. J. C. Y.	78	L. E. 20/15	19 days	None.
4. D. H. M.	64	R. E. 20/20	17 days	None.
5. E. E. C.	51	R. E. 20/20	11 days	None.
6. A. S.	63	L. E. 20/20	25 days	Vitreous loss; iris prolapse.
7. Dr. E. M.	56	L. E. 20/20	12 days	None.
8. J. W.	47	L. E. 20/20	16 days	None.
9. W. T. H.	65	L. E. 20/20	13 days	None.
10. L. A.	78	R. E. 20/25	19 days	None.
11. Mrs. M. W.	85	R. E. 20/30	17 days	None.
12. Mrs. O.	69	L. E. 20/40	14 days	Vitreous loss; iris prolapse.
13. M. B. N.	58	L. E. 20/50	10 days	Ruptured and retained capsule; iritis.
14. N. S.	80	L. E. 20/60	14 days	Ruptured and retained capsule; iritis; drawn up pupil; lowered, leaving clear fundus, macular degeneration.
15. E. J. P.	71	R. E. 0	10 days	Temporary insanity; iridocyclitis and occluded pupil. May make artificial pupil.
16. H. E. B.	45	R. E. 0	3 days	Hemorrhage from choroid on table.

In figuring the above averages, Cases 15 and 16 were purposely omitted.

Discussion. Dr. Thomas Faith said as there was such a wide discrepancy between the report of Dr. Fisher and the report of Dr. Findlay, it seemed hardly fair to the operator or to the operation to go any further without investigating the histories and records of these cases.

Dr. William L. Noble. In considering the 15 intracapsular cataract operations recently performed by Dr. Smith, of India, at the Illinois Charitable Eye and Ear Infirmary, there were some things quite definitely established. First, the trauma produced on the eye was far in excess of that produced by the well established procedure for the removal of cataract as practiced on the continent, in England and America. This trauma was responsible for the large amount of iridocyclitis which followed this group of operations. Second, there was much more danger of loss of vitreous in the Smith extraction than there was in the regular standard extraction for cataract. Third, the removal of the support of the vitreous by the posterior capsule introduced another element of danger which was not present in the regular standard extraction for cataract.

An honest ophthalmic surgeon would not allow his patients to take a single chance that they did not have to take when operating for the removal of cataract. He was convinced that no man could do this operation on a patient without subjecting the patient

to a very increased danger of an unfavorable result.

It must be remembered that this group of cases at the Eye and Ear Infirmary were selected and approved by Smith for operation. The whole group of cases was therefore much freer from those complications which would be found in the average of patients applying at that institution for the removal of cataracts.

Dr. Wiliam H. Wider stated: We knew that iritis and iridocyclitis frequently followed cataract extraction in the hands of any operator, however, skillfully performed. The degree of iridocyclitis varied in different cases Those who had had much experience in cataract work would agree that there might come a period about the sixth or seventh day after the operation, when the eye that seemed to have been healing normally without much sign of reaction, suddenly flared up and exhibited signs of iridocyclitis, the cause of which was not always determinable. In such cases, many operators, following the suggestions of Gifford, gave with great advantage to the patient, salicylic acid in some form. It would be manifestly unfair in such cases to charge this against the method the operator had used, unless it was clear that some infection had been introduced or the eye had suffered from unnecessary traumatism.

Probably more trauma to the eye was caused by the intracapsular method, and especially so in the hands of one who had not had the opportunity of acquiring the skill necessary to do the operation, such as Dr. Smith had, and consequently there would be more injury to the eye, more accidents, such as vitreous loss and more iridocyclitis. We ought to get as large statistics as we could to throw light on these phases of the subject. Vision did not appeal to him so much in settling the value of the method, because from the very nature of the case it might not be possible to get perfect vision. The tests of the eye before the operation might have shown excellent perception and projection and yet after removal of the cataract, the ophthalmoscope might reveal a condition of the fundus, such as posterior choroiditis or a hazy vitreous that would preclude good vision, even if the operation had been perfect in every respect. One need not necessarily pride himself because after cataract extraction his patient got 20/15; the operation might have been more shabby and the risks greater than in another one in which the vision was only 20/100.

Dr. George F. Suker had performed the Smith-Indian extraction on private and clinical cases He had had a number of cases at the Cook County Hospital in which he had assisted his interns to do the operation. There was no doubt at all, that in doing the Smith-Indian extraction the beginner did undue damage and inflicted trauma to the eye. He used altogether too much pressure. One need not exert any more pressure in delivering the lens than in doing capsulotomy. Exercise of proper delivery pressure was just as essential as good assistants. The direction of the pressure exerted was also absolutely an important factor. Considerable traumatism was caused by the strabismus hook riding too hard and long on the limbus in the region of the ciliary body. The line of pressure should be directed to the entrance of the optic nerve and stay well within the limbus—a rocking pressure—and then the iris was not unduly stretched or crowded back upon the ciliary body and processes. A properly placed iridectomy, not too large, nor too small was an essential requisite.

Looking back upon his experience with cataract extraction of the Smith-Indian type and capsulotomy method, he had not come to a definite conclusion as to which method he would prefer in all cases.

In all patients in whom there was a marked arteriosclerotic condition of the peripheral vessels, he was not in favor of the Smith-Indian extraction. As far as the loss of vitreous was concerned, a limited loss did not signify much complication or reduction in vision, if any. So far as visual acuity was concerned, 20/20 was not the final

criterion. For, usually, one did not know what the patient's visual acuity was prior to the cataract. It might not have been 20/20. Nor did we in every instance know the anatomic condition of the macular area, disc, choroid or retina; also there might be a high refraction error present, associated with amblyopia ex anopsia and thus 20/20 could not be attained, no matter what method of operation was chosen.

The great objection he had to the Smith-Indian extraction was not the technic or the results obtained, but rather the unsightly pupil. In the majority of cases there was a retracted pupil. Why it occurred, he did not know.

Dr. George F. Fiske said there were things which struck him as remarkable in these reports, the first one of which was the fact of the very fine visual results. The other was the high percentage of loss of vision. It seemed to him unfortunate that there should be a loss of 20 per cent in 30 cases.

Dr. Harry W. Woodruff, of Joliet, Illinois, stated that last Thursday he attended a meeting of the Kansas City Eye, Ear, Nose and Throat Club. A report was read of the cataract operations performed by Col. Smith. He could not give this report in detail, but he remembered that there was a 25 per cent loss of vitreous.

Dr. Fisher and Dr. Findlay replied to the remarks made in discussion.

ROBERT VON DER HEYDT,
Cor. Sec.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

October 11, 1921.

Foreign Body in Lens.

W. LIKELY SIMPSON presented J. C. with the following history: While hammering a chisel four days ago something struck his right eye. Since then vision has been slightly off in the right eye and there has been slight redness of the eye.

Right eye, V.=20/20; conjunctiva red; pupil is widely dilated, due to the atropin. The X-ray was applied and the foreign body located. The pupil had been so small that a satisfactory examination has hardly been possible except for the last few hours. The foreign body was to be seen to the temporal side and slightly below the center of the cornea about seven o'clock. The foreign body seems to be in the posterior part of lens. There does not seem to be any opacity of lens.

X-ray findings are as follows: The foreign body is located 4 1/2 mm. to nasal side of center of the cornea, 4 1/2 mm. above the horizontal meridian, 4 1/2 mm. posterior to the anterior surface of cornea.

DISCUSSION. Dr. Anthony thinks the foreign body is in the posterior surface of the lens. In one other case like this that he has seen, an attempt at extraction failed.

Dr. Lewis thinks it best to treat the case expectantly.

Dr. Stanford and Dr. Blue think that in either case there will be a traumatic cataract, and it is best to treat it expectantly.

Transient Squint, Encephalitis.

DR. A. C. LEWIS presented Mr. W. W., age 44, who was referred to him on May 19, 1921, for diplopia of 4 days duration.

He had a paralysis of the right external rectus, with 20 degrees internal squint in the right eye. With his glasses, O.U. +3.00 sph., his vision was 20/40 and 20/20 in the right and left eye respectively. Pupils normal in size and reaction, as were the fields and fundi.

The health of the patient was good. The teeth, tonsils and nasal sinuses negative. Urinalysis negative, blood and spinal fluid Wassermann negative. K. I., 10 to 20 drops t.i.d., and purgatives prescribed.

July 2nd. Patient returned to city, has been sick in bed for two weeks with fever and general weakness thought to be malaria. R. The squint is now reversed, the 20 degrees internal squint has changed to a 20 de-

gree external squint. Only external turning is present, and this is quite weak. Vision reduced to 20/60 in this eye, but pupils, fields and fundus still normal.

Being now suspicious of brain tumor, the case was referred to Dr. Bunting. He made the Barány and other tests and made a tentative diagnosis of brain tumor, but was uncertain of its exact location.

Aug. 3, R.V.=20/30. No diplopia directly ahead, but present when looking to either side or below.

Oct. 11. The eyes are normal in every respect except for three degrees of esophoria which was probably always present.

His only general treatment has been K.I. continuously for 5 months.

Dr. Bunting now thinks that the intracranial trouble was probably due to pressure caused by ventricular obstruction. The true etiology may always remain a mystery.

Discussion. Drs. Stanford, Simpson and Shea, think that this is most likely a case of encephalitis lethargica.

Injury to Cornea.

Dr. J. B. Stanford presented Mr. G. W. H., white, 21, driver of a fire insurance patrol, who was injured on July 31, 1921, by the explosion of a bottle of "home brew" in his hand. Besides minor injuries to his hand, he had a lacerated wound of the face, extending from the margin of the lower right eyelid near the inner canthus to the cheek, another from the inner canthus of the right eye to the crest of the bridge of the nose, and the right cornea was cut thru from the temporal limbus to the nasal limbus. The anterior chamber was empty and the iris was in contact with the cornea, but there was no prolapse.

Under local anesthesia, the cornea was completely covered by conjunctiva brought up from below. The skin wounds were closed by means of silk sutures. Atropin was used in the eye. On the sixth of August the conjunctival flap had slipped off the cornea into its original position, the corneal wounds had healed smoothly, the anterior chamber was full and the pupil nearly round. On September 3rd, the eye was clear and the vision was 4/200 unimproved. The poor vision is due to the corneal scar and to lenticular opacities.

Discussion. Dr. Savage thinks that the interesting point in this case is that there is no prolapse of the iris.

Intraocular Hemorrhage.

Dr. Robert Fagin reported the case of Mr. C. P. M., age 19 years, freight clerk at a local depot.

Previous Eye History: No trouble with eyes until September the 15th, 1921. While playing pool, he was struck a hard blow in the region of the left eye. There was very little pain following. Two days later the eye and the region around it became "blood shot." The third day blood was seen on the inside of the eye, so that patient consulted an oculist.

Findings at ten o'clock: Vision in O. D. 20/20; vision in O. S. 20/120, with some blood in anterior chamber.

At two o'clock the same day the entire globe filled with blood. Eye was painful, red and excessive lacrimation. Patient was put to bed for several days. Cold applications were used freely. The blood is now clearing up, but, as yet, we have been unable to see just what has happened, and what was injured by this blow.

Discussion. Dr. Anthony has not heard the history in this case, but thinks it now one of secondary glaucoma.

Dr. Hooker thinks that cloudiness in the anterior chamber is an inflammatory exudate.

Dr. Fagin can see no explanation as to why the hemorrhage was delayed. There is no increased tension, and there has been no pain since the first day.

Chorioretinitis.

Dr. Fagin also reported the case of Mr. B. Z. C., age 31 years, shoe clerk.

Previous History: Patient consulted Dr. Herron of Jackson, Tennessee, seven years ago on account of rapid loss of vision in right eye. The Doctor explained to the patient that there was a "spot" in the back part of the eye, and that he could not in

any way remedy it. The vision has been very poor in this eye ever since. Two weeks ago, patient noticed that vision in left eye had begun to fail, so he consulted me about it.

Findings: Vision in O. D. fingers at two feet; vision in O. S. 20/30.

Pupils dilated and in dark room, in the macular region of the right eye, a large white spot is seen. In this area there is total destruction of both choroid and retina. Below and adjacent to this, there is another area of old chorioretinitis, also, more is seen around the optic nerve. The macula of the left eye shows a very small area of beginning chorioretinitis, which gives him a vision now of 20/30.

Discussion. Dr. Hughes advised a spinal fluid Wassermann and salvarsan.

Drs. Stanford and Simpson advised elimination of all possible foci of infection, and antiluetic treatment.

Corneal Ulcer.

Dr. Fagin also presented Mr. A. D. Parkin, Arkansas, age 35 years, farmer.

History: Several years ago patient had a corneal ulcer on the left eye, which considerably impaired the vision in this eye for a time, but vision later improved. A week ago patient had chills and fever followed by herpetic lesions, which formed on his lips, and one formed on the old corneal ulcer on the left eye. This lighted up the eye condition again; so after years of inactivity, he has another corneal ulcer.

The patient was presented to show that corneal ulcers remain quiet for years, and, then, at any time, when the general health is lowered, they will light up again and give trouble.

S. S. Evans,
Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY.

November 19, 1921.

Dr. A. C. Magruder presiding.

Atrophy of Iris.

A. C. Magruder, Colorado Springs, presented a youth aged sixteen years, who had had congenital cataract in each eye, and had been operated upon by needling at the age of seven years. The vision of the right eye was 20/100, and of the left eye 16/200. The vision of the left eye was improved to 20/100 with correcting lenses. The case was shown on account of a very marked atrophy of the iris of the left eye, and also because of the great density of the capsular remains. Needling had been done twice, the second time without improvement. What did the members think of doing a simple extraction?

Discussion. C. E. Walker, Denver: If you cannot get thru with a Ziegler knife try Panas' forceps. The lens may be calcareous. If extraction is attempted the incision should be made below.

Anterior Polar Cataract and Persistent Pupillary Membrane. Muscular Anomaly; Discussion of Lethargic Encephalitis.

E. R. Neeper, Colorado Springs, presented a young woman aged seventeen years who had come complaining of occasional diplopia. The eyes were said to have been crossed for a time during early childhood, and then to have remained straight until nine months previously, when the right eye had turned slightly up and out. There was a small dense opacity to the outer side of the center of the anterior capsule of the right eye, and to this opacity were attached two brown strands originating in the region of the lesser arterial circle of the iris on the temporal side. There were three much shorter strands attached only to the iris in the same location. There was no history of injury or disease. The corrected vision of each eye was normal. The cover test indicated monocular fixation. The Maddox rod showed esophoria of five degrees. Either eye turned up and out while not fixing. Did the iris strands disturb the ocular movements?

Dsicussion. C. E. Walker, Denver, did not think that the attachment of the strands to the iris and lens had any connection with the muscular irregularity. The latter should be

analyzed with a candle light and with a red lens over one eye, placing the candle in a fixed position and moving the head in different directions; making notes of the findings and then taking them home for study. The patient might be developing a case of lethargic encephalitis.

W. H. Crisp, Denver, agreed that there was no connection between the anomalies in the lens and iris and the muscular defect. The strands attached to the iris and lens probably represented a form of persistent pupillary membrane, and it was further likely that the muscular irregularity was due to a congenital defect of innervation.

Dr. Neeper said that he had made the candle test, tilting the head in various directions, and the test was negative.

W. C. Finnoff, Denver, referred to a case of lethargic encephalitis occurring in a Denver surgeon. There had been an attack of influenza complicated by pneumonia. After a while double vision was noticed. Examination revealed a partial paralysis of the left inferior oblique muscle, and optic neuritis in each eye. The patient also had a great deal of difficulty in locomotion. After a while his hyperphoria improved very rapidly. The neuritis lasted about two months, but was not followed by atrophy. The case was pretty certainly one of lethargic encephalitis. Another patient who had had a faintly positive diagnosis of lues, looked slightly lethargic on coming into the office. There was complete paralysis of the external rectus muscle of the left eye, and the patient complained of severe headaches. He had previously been gone over from head to foot. While the fields were being taken the patient became very sleepy and fell off the chair. Dr. Finnoff made a diagnosis of lethargic encephalitis. He later heard that the patient had died.

Whether to Operate for Anterior Synechia in Patient's Only Eye.

E. R. Neeper, Colorado Springs, presented a man aged thirty-three years whose left eye had on October 6 been ruptured by a rock flying from an electrical drill. The blow had fallen on the outer part of the sclera, and had produced a rupture of the cornea about seven mm. long near the temporal limbus. At the time of the report the vision of this eye was 20/40. The other eye had been previously lost. There was a broad adhesion of the iris to the corneal scar. Should an operation be attempted to free this synechia, and in what manner?

Discussion. C. E. Walker, Denver. It is perhaps a little early to interfere with this eye. Secondary glaucoma is the only complication to fear. If you can keep track of the man there is no hurry. If an attempt to free the iris is made, I advise passing a knife completely across the pupil and making the incision to include the iris as the knife passes out. All you need is to free the iris at the point of attachment to the cornea.

J. M. Shields, Denver, thought that a man with only one eye should be prevented by medical or other control from endangering his second eye in such an occupation as mining.

G. F. Libby, Denver, recalled a case of perforating ulcer of the cornea which had resulted in adherent leucoma; and in which the patient had returned twelve years later with glaucoma in the same eye.

Congenital Paralysis of the External Rectus.

A. C. Magruder, Colorado Springs, presented a woman aged thirty years who gave a history of having had an annoying diplopia as long as she could remember, which occurred when she looked to the left. The vision of the right eye was 20/20 plus, and of the left eye 20/40 plus. There was a moderate astigmatic error in each eye. Apparently there was complete paralysis of the left external rectus. A blood Wassermann was negative. The case seemed to be one of congenital absence or congenital paralysis of the external rectus muscle.

Discussion. W. C. Finnoff, Denver, thought there were some muscle

fibers present. In that case the thing to do was transplantation of a half of the superior and a half of the inferior rectus to the normal point of attachment of the external rectus, as discussed by Woodruff and O'Connor at the recent meeting of the Academy of Ophthalmology and Oto-Laryngology.

W. H. Crisp, Denver, referred to two cases of apparent congenital absence of the external rectus which he had brought before the society several years previously. In each of these cases the patient had experienced no appreciable inconvenience and did not complain of diplopia.

Episcleritis.

A. C. Magruder, Colorado Springs, presented a woman aged fifty-three years, who had come complaining of redness and tearing of the right eye, which had lasted for ten or eleven months. She had been under the care of two other oculists. There was a definite marginal keratitis at the nasal side of the right eye. There was a marked thickening of the conjunctiva at the nasal side, with considerable enlargement of the bloodvessels. After removal of two lower molars and curetment of their sockets, the keratitis had improved considerably, but the episcleritis had not been affected. During the previous nine months, the episcleritis had attacked every part of the visible sclera, altho at no time occupying more than one-fourth of the total area. Examination of the nasal sinuses and general physical examination were negative. Treatment had consisted of atropin, dionin, hot applications, and powdered mild chlorid of mercury massaged in the inflamed areas.

Discussion. C. E. Walker, Denver. I keep these old cases of episcleritis on the iodids and tonics in addition to the local treatment.

W. A. Sedwick, Denver, thought that the case was likely of gastrointestinal origin.

W. C. Finnoff, Denver. The nasal side of the disc is slightly swollen. Beyond the nasal margin of the disc there is something which looks like a gray-ish exudate, with the bloodvessels running partly thru it, and extending almost half-way round the disc. Some of the peripheral bloodvessels are in poor condition. Scleritis coincident with vascular disease of the fundus is often due to tuberculosis. The way to determine that tuberculosis is playing a part is by obtaining a focal reaction with tuberculin. It would probably be safe to run the tests up to five mg. of old tuberculin before deciding that the disease is not present. In this eye there is not much danger of hemorrhage.

Powder Grains Embedded in Sclera.

A. C. Magruder, Colorado Springs, presented a boy aged seventeen years, who in July, 1921, had been injured in both eyes by an explosion of black powder. The cornea of each eye had been badly burned, and there had been innumerable powder deposits in the face and eyes. Two hours had been spent in removing the deposits of black powder from the corneas. A few grains, however, still remained in the sclera. Should removal of these be attempted by electrolysis or extirpation?

Discussion. W. C. Bane, Denver, felt that apart from cosmetic purposes there would be no advantage in attempting removal of the particles.

Wm. H. Crisp,
Secretary.

ROYAL SOCIETY OF MEDICINE.

Section of Ophthalmology.

Meeting of November 11, 1921, Sir William Lister occupying the chair.

Cyst of Krause's Gland.

Mr. Humphrey Neame showed three interesting cases. The first was one of cyst of Krause's gland. He did not feel quite sure of the diagnosis, as those glands were not so common in the lower fornix as in the upper.

His second case was that of a lad aged 16 who had **papular formations in the upper lid.** He had noticed nothing amiss until the beginning of October, when there was a marked swelling of both upper and lower lids,

and some swelling and tenderness of preauricular glands. The conjunctival secretion showed no eosinophiles, and the section showed only a zone of round celled infiltration, not sufficient to account for the papular formation. The character of the case would be settled on the histologic evidence.

Ocular Tuberculosis.

Mr. Neame's third patient had tuberculosis of the conjunctiva. The boy went for a holiday last year 40 miles away, going down by cycle; and at the end of the journey he was very exhausted. After returning to work, while stooping down, he felt something "go" in the left eye, and from that day the sight of the eye had gradually failed, so that in 6 weeks he could do no more than perceive a hand close in front of him. In September, 1920, he noticed swellings in the neck, and in March this year a cough started, and watering of the eye previously sound (the right). Sent to a tuberculosis hospital, the diagnosis made was Hodgkin's disease; there were no signs of tubercle in the chest, and no tubercle bacilli were found in the sputum. He had lost a stone in weight in a year, but there had been no appreciable loss during the last three months.

Four months ago he was admitted to Moorfields with iridocyclitis of the left eye; there was a hazy cornea, and the anterior chamber was full of a whitish substance. The eye was excised. A section of it was shown. The anterior chamber was filled with cellular and fibrous material, and iris and ciliary body were practically destroyed. Last month a part of the conjunctiva of the right eye was excised, and that showed a fairly typical tubercle formation. Two small glands from behind the ear were excised, and the material crushed and given to a guinea pig, but beyond a local reaction it produced no definite illness. The gland showed marked fibrous tissue formation, indicating that the process must have been very chronic.

Discussion. Mr. Mayou and Mr. Harrison Butler thought it likely that the cyst was one of spring catarrh, and advocated a further test for eosinophilia.

Operation for Ptosis; Angioma of Retina.

Mr. Lindsay Rea exhibited a case showing the result of a Poulard operation for ptosis, and one of *angioma of the retina*. With regard to the case of angioma, he referred to the similar case examined by Mr. Collins and described in the Ophthalmological Society's Transactions in 1892 and 1894. In the present case there was a large white mass over the macular area, and a large vein ran down the disc. The growth appeared to be pushing the retina in front of it.

With regard to the case of ptosis, he chose the Poulard operation in preference to a Motais, because it was then all in front of one, and one could see exactly how much to open the eye.

Discussion. The Chairman, speaking of the angioma case, said this condition must be of great rarity. The white masses in the fundus in this case must be decolorised blood clot, which was being gradually absorbed, like the "melting snow" variety seen in cases of large subchoroidal hemorrhage. As to the case of ptosis, he pointed out the difficulty of everting the lid after a Motais operation if a foreign body got into the eye. He himself favored the Hess operation for ptosis.

Mr. Treacher Collins did not consider angioma of the retina such a very rare condition; he spoke of several cases he had seen. With regard to the ptosis case, he preferred the Motais to the Poulard operation; he had done the former three times, and the results pleased him greatly. The present patient could not completely close his eye, so that it was probably open during sleep. But with a Motais, complete closure was ensured during sleep.

Abnormality of Iris.

Mr. R. C. Doyne exhibited a case of congenital malformation of iris and anterior chamber. The iris showed an absence of anterior layers in many

places, and there was a hole in each eye thru which the red reflex could be obtained. In the left eye the fibers of the suspensory ligament could be seen. Also the angle of the anterior chamber was malformed and appeared to be filled with whitish substance. Strands could be seen running from the posterior surface of the sclero-corneal junction to the anterior surface of the iris, and the margin of the cornea was opaque. The child was highly strung, but not particularly backward.

DISCUSSION. The Chairman referred to a case he once had in hospital of a man with nine pupils, one of them almost central, the other eight ranged peripherally. Eventually he developed glaucoma, probably having a relation to the congenital defect in the development of the angle of the anterior chamber, but there was no congenital defect in the iris.

Mr. Mayou and Mr. Collins discussed the probable causation of coloboma with bridge. Mr. Collins stating his opinion that the mesoblastic portion of the iris had two sources of origin; the anterior layer of the fibroplastic sheath and the blood vessels which grew forwards from the periphery of the anterior ciliary arteries, beneath the pupillary membrane.

The New Psychology and Problems of Vision.

DR. CHARLES F. HARFORD said that the attention of the ophthalmologist has hitherto been mainly directed to the anatomic and physiologic aspects of problems of vision. In his book on Diseases of the Eye, Parsons said, after tracing the processes of vision from the external object to the cortex cerebri, "here the nervous impulse is transformed into a pyschic impulse, which is not, and probably never can be, understood." Dr. Harford claims that psychology can offer an important contribution to supplement physiology, and that psycho analysis throws new light upon human thought.

Many are studying psychopathology without having grounded themselves in normal psychology, and his object in this paper is to formulate a scheme of the working of the "Psyche" which might help to interpret many of the problems of vision. He exhibited diagrams representing the mechanism of the Psyche, divided into three sections: cognition, affection, (standing for the emotional result of cognition) which led to action. Secondly, he showed a disc presenting the field of consciousness, which would present to the Psyche the visual and other images from external objects or from the memory. His third diagram showed six compartments which he referred to as the store chambers of the Psyche, namely, results of careful observation, results of casual observation, amnesia of common life, pathologic repression, infantile impressions, and instinctive and hereditary factors.

Emphasis was laid by the author on the emotional part of the Psyche, that which activates each mental concept, which Bergson called the "energie spirituelle." He proceeded to deal with the factors of repression, association, dissociation, and appreciation. He said the vision of the infant is only gradually evolved, not because of any organic defect of structure, but because of the gradual nature of the awakening of the intelligence. Strange objects, seen for the first time by normal adults, could not be recognized until they could be related to some previous visual memory.

Thrombosis of Retinal Vein; Hole at the Macula.

MR. ARNOLD WILLIAMSON first referred to the careful paper on holes in the macula published by the late Mr. Coats, in which he summarised the various theories of causation. Monteith Ogilvie considered there were two factors concerned; the fact that the retina is thinnest at the fovea, and thicker around it than elsewhere, and the fact that waves of disturbance passing thru the eye meet at the posterior pole and tear the fovea by "contrecoup." Fuchs attributed it, in traumatic cases, to mild traumatic retinitis, the slight serous exudate rupturing the membrana limitans externa,

so causing the appearance of a macular hole.

Coats believed edema was the underlying cause, stating that a hole had never appeared less than 60 hours after the injury, also that opacity in the retina had been observed after injury in a case in which a hole subsequently developed. In 1908, however, Kipp and Alt published, in the AMERICAN JOURNAL OF OPHTHALMOLOGY, a case in which a boy was shot thru the orbit, tearing the optic nerve and its sheath, and entering the skull. On the following day the retina was whitish, and vessels narrow, except for a vein passing from macula to disc. At the macula was a red deep round spot, one-third D; two days later the retina was more opaque. Four days later the eye was excised, and there was a large hole at the macula, surrounded by swollen retinal tissue. There was evidence of edema everywhere. Kipp and Alt consider that the retina at the macula can be torn by contrecoup.

Mr. Williamson showed slides of this case of his because they made clear the dependence of the formation of a hole in the macula on the occurrence of subretinal edema associated with thrombosis of the central retinal vein. The patient was a woman aged 62, whose sight began to fail 14 years ago. For two years, until excision of the eye in July last, she had continual pains in the head. The eye was excised because of absolute glaucoma. Thirty years ago she had a fall, blacking both eyes, but the sight was not impaired. The excised eye showed a corneal nebula, a cellular exudate adherent to the posterior surface of the cornea in places, and hyalin exudate passing round the lens and causing some adhesion of the iris to it. There was no cupping of the disc.

He exhibited sections on the screen by means of the epidiascope. There was an absence of the inner nuclear layer and inner reticular layer, and the retinal pigment layer was separated from the inner layer of the choroid. There was also some edema in the outer molecular layer of the perimacular region. The special point was, that the cyst was formed not in the retina, but in the accumulation of edematous material between the membrana limitans externa and the retinal pigment layer. In consequence of the presence of this cyst, the outer layer of the retina appeared to undergo a degenerative process, so allowing of the formation of a hole.

The second case was also discussed at length, and sections exhibited and demonstrated. In both cases there seemed to be a toxic influence, as shown by the iridocyclitis, acting on the retinal veins and producing thrombosis, and acting on the delicate macular choroidal capillaries causing regeneration of their walls, increased permeability to fluid, and hence edema; this fluid then osmosed thru the potential space between the rods and cones and the pigment epithelium, preventing the access of nutrient materials from the choroidocapillaris, so that the superjacent retina degenerated and formed a hole.

DISCUSSION. Mr. M. S. Mayou, showed, by the epidiascope, sections from a typical case of albuminuric retinitis which he had some years ago. Here exudation was seen in two places; interretinal exudation, and subretinal exudation. He believed the albuminous fluid in the layers of the retina was derived from the retinal vessels, but the subretinal fluid he thought came from the choroid. The two had a different consistence and response to the staining reagent.

H. DICKINSON.

SPECIAL REPORT

UNION MEDICAL COLLEGE, PEKING, CHINA, AND THE WORK OF ITS DEPARTMENT OF OPHTHALMOLOGY.

GEORGE E. DE SCHWEINITZ, M.D. L.L.D.

PHILADELPHIA, PA.

During a recent visit in Peking (September 1921), on the occasion of the formal opening of the Union Medical College of that city, the ceremonies of which included scientific addresses, papers of notable interest and clinical conferences conducted with admirable precision and illustrated with abundant material, opportunity was afforded of observing and participating in the work of the Department of Ophthalmology. The account which follows it is trusted may be of interest to JOURNAL readers:

For the work of the out patient department, or dispensary, the necessary space is allotted in the hospital, and consists of a waiting and record room, excellent dark rooms for ophthalmoscopy, for retinoscopy and for refraction, a small operating room suited to minor surgical procedures, each equipped with admirable facilities and instruments of precision.

One is immediately impressed with the care with which the records are made, and the thoroness with which each patient is examined, as may be inferred from the attached blank. (See p. 142.) Necessarily, the history sheets are replete with data of real value.

For the in patients 5 per cent. of the available beds of the hospital is allotted, not as yet sufficient to meet the large opportunities here presented for the investigation of many important ophthalmic problems, a deficiency, it may be assumed, which will be supplied at a later date.

The Department of Ophthalmology of the Union Medical College of Peking is fortunate in that is has secured the services of Dr. Harvey J. Howard, as Professor and Director, whose table of organization follows.

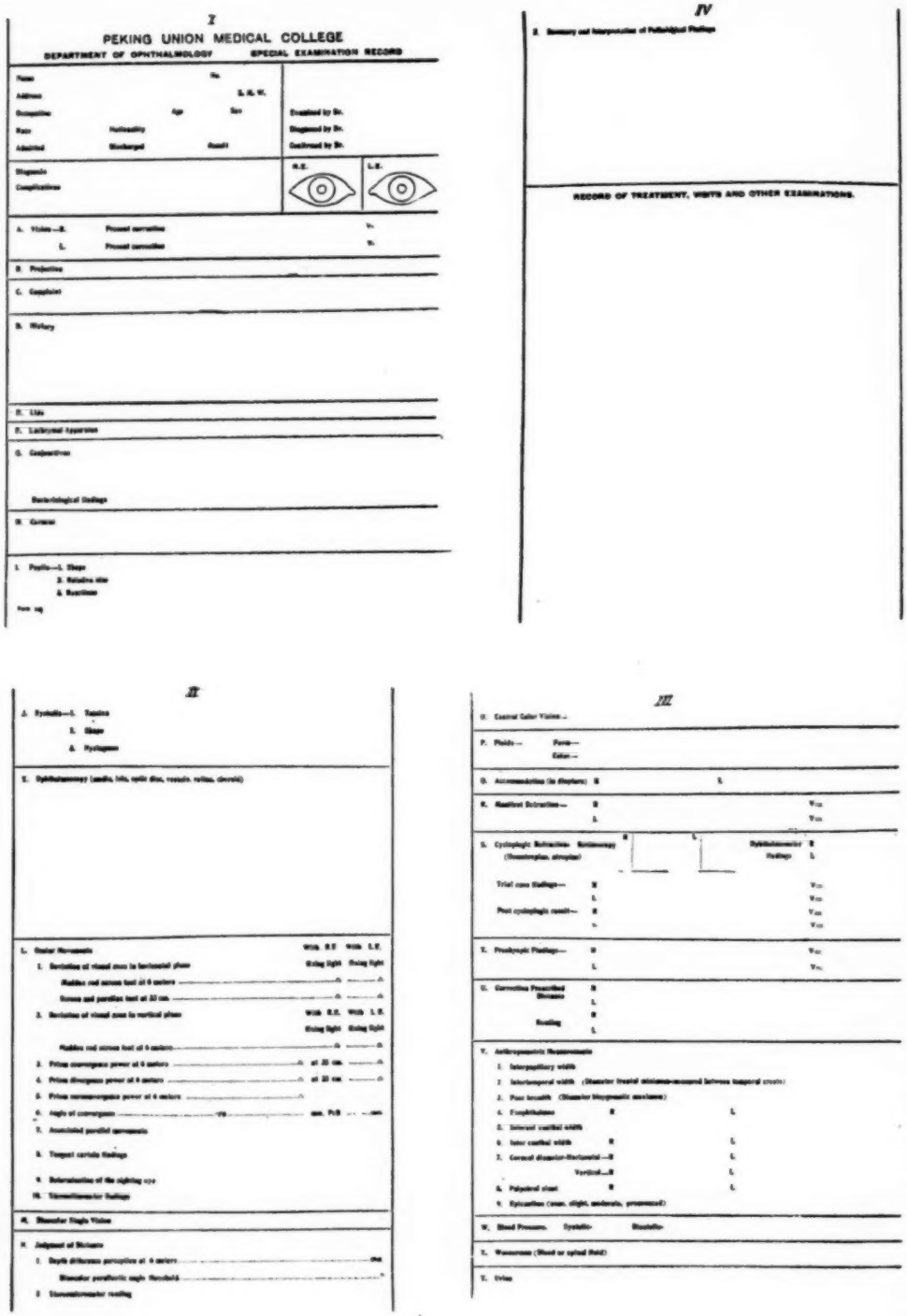
Professor	Dr. H. J. Howard
Associate	Dr. T. M. Li
Associate	To be appointed
Clinical Assistant	Dr. H. T. Pi
Clinical Assistant	Dr. T. T. Dzen
Clinical Assistant	To be appointed
Assistant Resident	Dr. W. P. Ling
Senior Interne	Dr. John Hong
Assistant Technician	Kuan Wen Yu
Secretary	Miss M. V. Woodman
Illustrator	C. H. P'u

Dr. Howard's large experience, originally acquired in Canton, and later in Peking, ably supplemented by his Chinese associates and assistants, coupled with his familiarity with the customs and language of the country, his administrative ability and intelligent grasp of problems presented, constitute assets of unusual value.

During the past year, 2074 new patients applied for treatment, the number of visits recorded being 13,130; the total visits per patient averaged 6.33, an average which Dr. Howard regards as very high. In addition to this, there were 2,405 visits from private patients, three-fourths of which were paid by foreigners and one-fourth by Chinese.

Fully 60 per cent. of the new patients (referring now to the Chinese) have trachoma, or the sequels of this disease, and the opportunities of studying all the stages of this affection are abundant[1]. Some unusually interesting observations have been made pertaining to the communicability of trachoma, to the incubation period, that is, the time which must elapse before the earliest manifestations of the disease are evident, and when the exact date of contact with an eye definitely trachomatous is known, to the corneal lesions, especially at the lim-

1. In this connection it is interesting to record the trachoma experience as reported by Dr. W. S. Thacker Neville in Moukden, Manchuria. Out of a total of 2,287 patients, 1023, or nearly one-half of them, were the subjects of this disease.



Record Blank Department of Ophthalmology, Peking Union Medical College. One-third of full size.

bus, and to the effect of early treatment in staying further elaboration of the affection. A report of these studies will doubtless be published in the near future, and cannot now be anticipated in further description. The corneas and conjunctivas of each trachoma patient, suited to such examination, are studied with the corneal microscope, and nowhere else has your correspondent seen more satisfactory use of this excellent instrument in these circumstances.

The routine treatment consists in a moderate "expression" of the affected area, performed with as little traumatism as possible. The "follicles" having been picked open with a cataract knife, their contents are expressed with Prince's forceps, or squeezed out by means of pressure exerted with the aid of gauze or cotton sponges wrung out of a saturated boric acid solution, or a 1-5,000 bichlorid solution. Instillation of a few drops of olive oil or of paraffin completes this stage of the procedure. The patient is required to return on the following day, when the everted lids are gently rubbed with swabs dipped in oil, whereby any adhesions which may have been formed are broken up. Depending upon the severity of the case, after cocain anesthesia, "rubs" with a cotton wound applicator, dipped first in bichlorid solution (1-1,000) and next in dry boric acid powder, are repeated daily, or every other day, followed by iced compresses. When six such treatments have been given, the strength of the bichlorid solution is increased to 1-500. In general terms, discomfort usually ceases after the first three or four treatments. If necessary, and to shorten the length of treatment, a second expression operation may be, and often is, performed.

Dr. Howard adopted this method of treating trachoma largely because of the good results he had witnessed following its employment in the New York Eye and Ear Infirmary about ten years ago, and altho many other procedures and applications have been tried by him and his assistants in their work in China, none has proved to be as satisfactory.

The description of this method of treatment is recorded because, well known tho it is, and often utilized in many clinics in our country, too frequently it has been abandoned, largely, it would seem, without sufficient trial, and where the technic has not been carried out systematically and with thoroness. This procedure, or at least one very similar to it, constituted the routine treatment of trachoma in your correspondent's ward in the Philadelphia General Hospital many years ago; it was gradually displaced for other methods, but it may be questioned whether they were more advantageous. Certainly it accomplishes its results, to wit, the removal of the morbid material with less traumatism than many other varieties of expression, brossage and grattage. Dr. Howard has compared the effects of these rubbings with applications of silver nitrat, sulphat of copper, and carbon dioxid snow, but has always returned to the technic which has been described. It is interesting to note that he and his assistants are impressed with the value of "zinc drops" (1/2 per cent. solution of sulphat of zinc being instilled by the patient five or six times daily). Should the condition prove to be stubborn, these "drops" are alternated with a glycerit of tannin mixture; boroglycerid is also used. During the past war "zinc drops" were much used in the treatment of trachoma as it appeared among the Chinese coolies in the B. E. F., and also in the A. E. F., as described by Dr. Derby in his account of the trachoma problem in France. (A.J.O. v 2 p. 500).

Naturally, in the presence of marked corneal involvement, that is, in addition to pannus, superficial keratitis, the technic described is delayed until the active inflammation has subsided under the influence of the usual remedies. In suitable cases, simple and combined excision of the tarsus (Heisrath's operation) is performed as occasion may require. A special tra-

choma clinic is in operation, where the treatment is carried out, thus preventing the mingling of trachomatous and nontrachomatous patients.

Refractive errors are in all suitable cases corrected, after the use of a cycloplegic, usually homatropin, and there is an admirable arrangement for this work, consisting in a series of booths, each containing a trial case, a suitably constructed electric bulb for retinoscopy and an electric ophthalmoscope, and each booth is in direct line with an artificially illuminated type card, six meters distant. The assistants in charge of this work are thus enabled to make all the usual tests without changing their own or their patient's position; should ophthalmometric examinations be required, the instrument is close at hand.

The incidence of myopia is high, fully 53 per cent. of the patients presenting this type of refractive error, not infrequently in high degree, and often associated with the gross fundus changes common to this condition. It is more than probable that the imperfection in illumination in Chinese work shops may be one of the determining factors in this high percentage of myopia, but the frequency of corneal scars, the result of trachoma and of keratitis, must also be reckoned with in this regard. As is well known, the frequency of myopia among Egyptians has been ascribed to this cause.

Fine vitreous changes, independent of myopia or detectable uveal tract disorders, consisting in delicate flakes and strings, almost always in foreigners who in other respects are apparently entirely normal and who are comparatively young in years, are quite frequent. Generally the patients are unaware of their existence, and they are discovered during the routine examination incident to the measurements of refractive errors. Dr. Howard, who has carefully studied a number of these cases, is inclined to ascribe the lesions to focal infections. It is the impression of your correspondent that similar vitreous changes have been noted with undue frequency among the people of foreign birth residing in tropic and semitropic countries. It is probable that metabolic studies would reveal that they are an interpretation of faulty diet. Indeed, this was apparently the case in some investigations made by your correspondent similar to those undertaken to eludicate the causes of certain obscure types of scleritis and uveitis, where unquestionably the diet factor was important.

Anomalies of muscle balance receive careful attention, not only the usual heterophorias and common types of comitant squint (corrected by advancement, Reese's muscle resection being a favorite procedure), but also those conditions which require tenotomy of the inferior oblique, performed according to the direction of Duane and White and to meet the indications as described by these authors. The results have been most satisfactory, and the opportunities for employing this procedure more frequently present themselves, or perhaps are more frequently seized, than is usual in ordinary dispensary practice. For the past two years the Union Medical College has rendered service to the Aeronautic Department of the Chinese Government by examining and classifying all their flying cadets; Dr. Howard's large experience and excellent work at Hazelhurst Field during the war being especially useful in this respect.

Altho pulmonary tuberculosis is common in China, its ocular manifestations among the patients of the Peking Clinic are comparatively rare; during the past year, in only two cases has this infection been definitely demonstrated as the etiologic factor, in both instances uveal tract disorders. Tuberculin treatment is utilized with satisfactory results. The investigation of phlyctenular keratoconjunctivitis, a frequent affection, has not satisfied Dr. Howard and the members of his staff that this disease is a manifestation of tuberculosis.

Ocular syphilis is common in all its usual varieties, and sometimes in rather unusual lesions, for instance, gumma of both upper and lower lids.

A rare condition, subconjunctival granuloma, is occasionally encountered (three cases in one year).

The opportunities in ocular pathology are admirable. Specimens have been sent, and are being sent, by medical missionaries from all over China. In no other way could a large and valuable collection be made, classified and examined in one laboratory, because it is difficult to persuade a Chinese patient to permit the enucleation of an eye, no matter how insistent the indications are for its removal. With the opening of the new laboratory, a systematic investigation of these specimens will begin, and in part preparation for this work Dr. T. M. Li will spend his furlough in America, and devote his time to additional studies in the pathologic histology of the eye.

Cataract, Dr. Howard informs your correspondent, is comparatively uncommon in North China as compared with South China, and in his clinic the operations do not exceed in number, in fact, do not equal the number, of those which would be performed in an American clinic of equal size. The operation often performed is an intracapsular extraction, but not the so-called Indian or Smith method, preceded by a conjunctival flap so arranged that it can be stitched in place at the conclusion of the operation—a real advantage should there be loss of vitreous.

Glaucoma is common, and in the chronic varieties of the disease corneoscleral trephining (Elliot's operation) is often performed.

Naturally, toxic amblyopias of the usual types are encountered, but now and then a patient comes under observation presenting the visual interpretations of axial neuritis (intoxication amblyopia) whose history fails to indicate with any certainty the etiologic factor. It is possible in some of these cases that the optic nerve changes are due to large doses of "Chinese medicines," but in most instances the content of such medicine is unknown. Doubtless when the study of these medicines, now being undertaken by Dr. Reid of the Union Medical College in Peking, has progressed further, more information will be available. In one case examined, the loss of vision and optic nerve changes followed the free use of a decoction of vinegar in which green peppers had been steeped. The rapidity with which the blindness developed, however, suggested to Dr. Howard and his associates that the vinegar may have been contaminated with methyl alcohol; none of it was available for analysis.

Some effort has been made to investigate the eyes of those Chinese who have come from, or are residents in, the districts where starvation is prevalent, without finding gross corneal changes, for instance, keratomalcia. Only once did your correspondent see in a "starved man" eyes which were destroyed as the result of keratitis. The patient was not in the Peking Clinic.

Reports have come from some regions in China of sudden blindness, probably, it would seem, due to retrobulbar neuritis, followed by cataract formation, occurring usually in women after prolonged violent excitement and fits of anger. Such cases have not been observed in the Peking Clinic, nor have Dr. Howard and his associates noted optic nerve changes in the natives which differed in their etiologic relationships from those commonly observed in Western Clinics, save only as noted in connection with the toxic amblyopias. The usual ocular results attributed to focal infection are observed, but apparently not more frequently than in our own clinics, and presenting no special peculiarities.

One of the important functions of the Peking Union Medical College is to afford opportunities for graduate instruction, for instance, to medical missionaries; and in the Department of Ophthalmology such courses are in operation. Your correspondent desires to pay a tribute to the Medical Missionaries. Their earnestness, the excellence of their work and its far reaching effects, their fine disregard of difficulties, discouragements and danger, and their unfailing "manly pluck" are beyond praise.

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NAMING AND CLASSIFICATION OF CORNEAL DISEASES.

Some readers may have queried, what is the use of printing a paper like that beginning on page 8 of the January number? The services it can render differ widely from those to be expected from most of the articles here published, but we believe that they are real and important. As our literature stands now, this collection of names for corneal conditions may serve as a glossary of terms not elsewhere brought together, but any one of which may be encountered in reading the literature of our specialty. From the synonyms thus grouped, one may understand the terms that are unfamiliar by those already known; and some will be found unfamiliar by any one, who has not been searching recently thruout the literature as widely and deeply as has Dr. Calhoun.

But the great service of such a paper is the bringing home to every reader how unsystematic, bulky, illogical, burdensome and unsatisfactory our nomenclature of corneal conditions has become; and how much need there is to recast it upon rational scientific lines. The abuses of language here revealed have arisen slowly, one at a time; and have been perpetuated and extended without any appreciation of the bulk of the list of useless words thus accumulated. To get rid of these we must have careful study and discussion of them by a group of ophthalmologists most competent for the purpose, and a general agreement by all of us to use the name for each condition found most appropriate. Only by such a step can we do away with the need for learning and carrying in mind so many useless terms, and get rid of the uncertainty and indefiniteness that arise from overlapping meanings and the perpetuation of the implied erroneous conceptions of pathology.

These names have been given on account of a chance association or a fancied relationship, without any sufficient reason for thinking of them in the connection that the name implies; or they are retained after the related

condition has changed or lost its importance in our conceptions of general pathology. Why should a certain form of inflammation be called eczematous, when eczema is a disease of the skin, and this inflammation is seen only in a mucous membrane? The resemblance of eczema to catarrhal inflammation of mucous membranes does not justify such use of the term, neither does the accidental coincidence of eczema with the corneal inflammation. Why should keratitis be called scrofulous, when the term scrofula has lost its significance and importance: why should it be known as phlyctenular, when this applies only to a single brief stage and one in which the lesion is not usually seen. Some of us may think of it as anaphylactic. But must this term be added to all the others to burden our memories and increase the uncertainty and confusion regarding a rather common condition; to be later cast aside, perhaps, when our ideas of anaphylaxis have become slightly different and more definite than they are now?

The fact that a pneumococcus ulcer tends to creep over the surface of the cornea, rather than to excavate deeply in a certain fixed location, is interesting and clinically important. But that does not justify giving it the name "ulcus serpens." Neither does the fact that pus from it often settles at the bottom of the anterior chamber justify calling it "hypopion ulcer." The hypopion may be there one day and absent the next, yet it is the same ulcer with the same etiology, dangers and treatment.

That certain linear opacities in the cornea may seem to show a resemblance to the lines that go to make up letters, is an interesting observation; but does not justify the burdening of language with the term "buchstaben keratitis," promptly translated into "alphabet keratitis." Interstitial inflammation is a pathologic misnomer when applied to the cornea, that has no interstitial tissue, in the sense in which it is recognized in the kidney or liver. The term parenchymatous keratitis is a little better from the anatomic standpoint, but it gives no indication of etiology, prognosis or treatment.

Perhaps enough has been said to show sufficient reason for calling attention to the very unsatisfactory condition of the nomenclature and classification of corneal diseases. What is to be done to improve them? First we can be careful not to use those terms that are manifestly inappropriate, or superseded, or consist merely of partially descriptive terms translated into Latin or some foreign language, like creeping ulcer into "ulcus serpens," or "buchstaben keratitis." Second, representative bodies, or an international congress, can take up this matter and appoint a joint committee that will go over the list, choose the best name proposed for each condition and suggest a brief, simple scheme of classification. Science is classified knowledge, as contrasted with the chaos of knowing simply isolated or ungrouped facts. The difference is as great as between a library arranged and cataloged, and a junk shop piled with miscellaneous old books, pamphlets and journals. Practical knowledge is the arranged, related, classified knowledge.

In this classification of corneal diseases two possible bases for classification stand out clearly. *Etiology*, which implies course tendencies, prognosis, treatment, sequels; and ***anatomic structures,*** the epithelium, Bowman's membrane, the parenchyma, Descemet's membrane, endothelium, nerves, and lymph channels. Upon these must the classification be based. A possible outline of classification is given by Calhoun in six lines, on page 8. It ought not to be very difficult to arrange one, both simple and comprehensive; and then the practical gains to be effected thereby should rapidly bring it into general use.

E. J.

THE WASHINGTON CONGRESS, JOIN IT NOW.

Few American ophthalmologists have had the opportunity of attending an International Congress of Ophthalmology. The only one ever held in

America was the New York Congress of 1876, forty-five years ago. Of the eighty-nine members of that congress not more than five are now living. None of the congresses held in Europe has been attended by more than thirty ophthalmologists from this country. The way to hold such gatherings more frequently in the Western Hemisphere in the future, is to make the Washington Congress a strikingly successful one. Many of the papers offered for presentation and discussion have been prepared by some of the best known ophthalmologists in the world. The forty or thereabout, which will have a place in the presession volume and on the program, will furnish four days of scientific proceedings of very high interest. The demonstrations and the visiting of places of special interest in and near Washington, provided for in the arrangements for the Congress, will ensure the complete use of the time. But these arrangements can only be fully available for those who have previously made themselves familiar with the opportunities that the Congress will offer.

The annual gatherings of each of our National Societies are planned along much the same lines year after year; but this Congress will necessarily be arranged on a plan differing in many respects from such annual gatherings, and from earlier international congresses. Every member will be able to spend his visit to Washington more pleasantly and profitably if he goes there knowing as much of these plans as possible beforehand.

Manifestly the presession volume, the program and circulars of information, can be sent only to members of the Congress. General medical journals and even ophthalmic journals can give only a few general announcements regarding the things each member should know. The satisfaction of attending an annual meeting of the American Medical Association depends much on use of the special number of its Journal each year largely devoted to descriptions of the place and plans for the meeting. The Congress has no such widely circulated medium, thru which to inform those who hope to attend it, but have not become members.

Moreover the presession volume is now going to the printers. There is no way of knowing how many copies will be needed except by the number of those who have become members. It would be a poor way to use the money of those who have paid their dues, in printing volumes for those who have not given any indication that they will want them. The same is true of the program for the meeting, which will be a rather important publication, containing as it will an abstract of each paper in all the official languages of the Congress: French, Spanish and English.

Information will be desired as to reduced railroad rates and hotel accommodations. This can be furnished promptly and directly only to those who have joined the Congress. On every account if you are interested in the meeting send in your application and membership fee, to the Chairman of the Membership Committee, Dr. Walter R. Parker, David Whitney Building, Detroit, Michigan, *at once*. Even if you cannot attend the Congress you will be glad to have the record of its proceedings for reference in years to come.

The success of the Congress is now assured; its present list of members, about 800, assures a gathering of ophthalmologists much larger than any that has ever assembled in the past. But unless this list is again more than doubled, the meeting will not have done all that might have been done for ophthalmology in America.

E. J.

BUTYN A NEW LOCAL ANESTHETIC.

In September, 1884, Carl Koller, then a resident of Vienna, but for 33 years practising in New York City, announced in a paper read before the Heidelberg Congress by Brettauer, the discovery of the anesthesia produced by the local application of cocain to the conjunctiva. Ever since that time the search for other substances equally efficient as local anesthetics has gone on. Several valuable local anesthetics

have been discovered; but except for injection in large doses into the tissues, and for corneal anesthesia when dilation of the pupil was especially undesirable, cocain has still been the general favorite. Procain (novocain) has proved safer for injection, and holocain is free from any practical objection on account of pupil dilatation.

The latest claimant, *Butyn* (with y sounded like i in tin), comes before the ophthalmic profession with its value approved by careful investigation. Its manufacturers submitted the claims made for it to the Council on Pharmacy of the American Medical Association, who found it to be a synthetic product having the constitution and properties claimed; and called to their aid the Committee on Local Anesthetics of the Section on Ophthalmology, to study its medical and anesthetic effects in clinical use.

The report of the Committee, published on page 56, shows that it is the most important rival to cocain that has yet appeared. It is superior to cocain in that it does not dilate the pupil. The fact that it is a synthetic avoids any danger of a scarcity thru cutting off of the supply of a raw drug. Its advantages are briefly set forth in the conclusions of the Committee on page 60. It is probably too soon to claim that Butyn is nonhabit forming, and the careful practitioner will not presume on the apparent advantage of its being less toxic. But the results of the careful investigation that has been going on for about a year, and the competent conservative character of the members of the Committee that reports upon it, fully justify its extended trial by all progressive ophthalmologists. E. J.

BOOK NOTICES.

L'Iris. Etude physiologique sur le pupille et ses centres moteurs. By **Dr. A. Magitot.** Ophthalmologist to the Paris Hospitals, Octavo 272 pages, 27 figures in black and in colors. Paris: Gaston Doin, 1921.

This monograph presents to its readers, directly and clearly so far as they are known, the facts regarding the physiology of the iris; its anatomy, especially that of its muscles; and the movements of the pupil, with the centers and tracts that control them.

It is divided into two parts. The five chapters of the first part are headed respectively: Anatomy of the Iris, The Innervation of the Iris; The Pupil and the Iris Movements; Pupillometers, and the Action of Collyria on the Pupil. Part two, in the first chapter deals with the reactions of the pupil related to the function of vision, the photomotor reflex and the reaction with accommodation and convergence. The second chapter takes up the reactions independent of the visual function, and ends with a résumé of the pupillary innervation. The pathologic reactions and the relations of the pupils are not discussed.

The way in which the various topics are handled may be illustrated by the discussion of the iris movements (Chap. III). After considering the vasomotor supply of the iris, its aspect during contraction or dilatation of the pupil, the musculature and the theory of inhibition, Magitot takes up the theory of antagonist muscles. He begins by giving the arguments and experiments against a dilatator muscle, and then marshals those that favor a dilatator muscle, including the experiments of various physiologists and his own repetition of those of Langley and Anderson. Then the arguments for and against the membrane of Henle as the possessor of this dilatator function are considered, and the possible function of the branching cells of the stroma, as urged by Munch and Lauber is noticed rather favorably. Other headings in this chapter are the sensibility to light of the iris muscle itself, the state of the pupil during sleep, during syncope, coma and after death.

The movements of the pupil and their significance have an extensive literature, yet many questions about them remain unanswered. This book by its clear review of what we can accept as known, and its fair presentation of opposing views, brings the reader to that border of our knowledge

that marks where fruitful investigation may begin; and in some things it indicates the directions that such investigations might take. A very interesting brief review of the comparative anatomy of the iris is given in the chapter on its anatomy. This is the more valuable because the structure of the iris in different animals varies widely from that of man, or even from that of closely related species; and much of the evidence regarding the iris function rests on experiments on the lower animals.

The book is furnished with an alphabetic index, as well as a table of contents. It is printed chiefly in large type, with medium sized type for notes, quotations, etc. The conspicuous headings and systematic arrangement make it easy to find anything that the work contains. The illustrations are chiefly diagrams that serve to clarify and abbreviate the text. E. J.

Government Ophthalmic Hospital, Madras. Report and Statistics for 1920. Major **R. E. Wright,** I.M.S., Acting Superintendent. Quarto, 16 pages. Madras. Printed by the Superintendent Government Press.

This pamphlet, issued "for official use only," contains some observations that are of wide interest to ophthalmologists. The difficulties overcome in this service are revealed in this sentence: "As usual it was not found possible to limit admission to the number of beds available. The surplus sick were accommodated in the verandahs." The extent of this practice appears in the tabulated statistics. The number of beds was 170, the average daily sick 264; and one day the total rose to 300. The total number of "in patients" treated during the year was 3,797; the total of out patients was 20,138.

This large amount of clinical material is being utilized for teaching in the Elliot School of Ophthalmology, better than many large clinics in America. For the year reported upon, its opportunities were used by 81 medical students, graduate courses were taken by 20 civil assistant surgeons and 4 "overseas Doctors," from England, continental Europe, New Zealand and Australia.

An interesting change in the technic employed in this hospital is the use of a saturated watery solution of picric acid. Before the patient comes to the operating table, this is painted over the lids and brow; and after cleansing the conjunctiva with swabs of saline solution, a swab dipped in the picric acid solution is used to rub the lid margins. Instead of boiling the knives and needles, they are put in a special tray with the blades submerged in pure lysol. Immediately before use, they are rinsed in a wide mouthed jar of absolute alcohol, and wiped with a piece of sterile lint. In this way oxidization of the blades is avoided, and a larger number of operations can be done with a knife before discarding it.

It is instructive to note the experience with sclerocorneal trephining, in this hospital where Col. Elliot first brought the operation into general notice. It was done 237 times during the year. In 197 cases it was done for glaucoma, in 30 for staphyloma, in 7 for retinitis pigmentosa, once for occlusion of the central retinal artery, and once for detached retina. In the majority of glaucoma cases that come for operation in Madras, the sight has been lost. Thus 40 had no light perception and 19 had been unable to get about alone for over 3 months, of whom four got some improvement. Of 21 blind less than 3 months, three regained light perception.

Operative removal of the lacrimal sac was done 227 times. The external operation under local anesthesia is adhered to. It is quick, bloodless in the majority of cases and gives good results. The case for the external operation is considered proven until something faster, which gives better results as to subsequent lacrimation, is devised.

There were 52 cases of keratomalacia. The experiment of feeding the infants a mixture of milk fat, fresh fruit juice and yoke of egg, was tried; but gave no better results than the admin-

istration of cod liver oil. One case of quinin blindness is reported, in a boy of seven, who took 6 grains of quinin in 9 hours, and awoke blind the next morning. The eyes remained blind, pupils dilated and without response to light until 17 days, when paracentesis was done on each cornea. After 4 or 5 days light perception returned, and a month later vision in each eye was 5/15.

We know of no publication that gives in a few pages more of the really valuable results of careful clinical observation of eye diseases. If writers would generally keep in view the penetrating power of terse statement, the attractiveness of brevity, much would be read and remembered, that is now unnoticed or forgotten because hidden by the unimportant recitals in which it is buried. E. J.

The Evolution of Modern Medicine. Sir William Osler, Bart., M.D., F.R.S. Small quarto, 262 pages, 107 illustrations. New Haven, Yale University Press. 1921.

Every physician needs to read some books for their general cultural value, to broaden his outlook and help him keep out of ruts. Some would say the specialist has most need of this. The book before us is one of the kind best suited to meet this need. Its subject should be attractive to any member of the medical profession; it is approached from a broad outlook on both medicine and history; and the wise selection of matters to notice, and the clear, direct style of the writer make it very easy to follow and grasp the line of thought.

The book records in permanent form six lectures delivered at Yale University, and the Silliman Foundation, in April, 1913. The Silliman Foundation was established in 1883, and this appears to be the fifteenth series of such lectures thus far published. Those by Sherrington on the Nervous System, Bateson on Problems of Genetics, Verworn on Irritability, and Haldane on Respiration (two series) are those most closely related to medicine; the others dealing with various phases of science and history.

The manner in which the subject of the lectures is presented is indicated by the chapter headings, which are:

I. Introduction, which deals with the origin of medicine, Egyptian Medicine, Assyrian and Babylonian Medicine, Hebrew Medicine, and Chinese and Japanese Medicine.

II. Greek Medicine; subdivided under these headings: Asklepios, Hippocrates and the Hippocratic writings, the Alexandrian School and Galen.

III. Mediaeval Medicine: The South Italian School, Arabian Medicine, the Rise of Universities, Mediaeval Medical Studies, Mediaeval Practice, and Astrology and Divination.

IV. The Renaissance and the Rise of Anatomy and Physiology, including Paracelsus, Vesalius and Harvey.

V. The Rise and Development of Modern Medicine, ranging from Boyle and Morgagni to Internal Secretions, with a page on the Development of Chemistry.

VI. The Rise of Preventive Medicine; with subheadings on Sanitation and Tuberculosis.

The references to the eye and its diseases are not numerous, the fees and penalties for operations on it in the code of Hammurabi, the eye of Hotep in Egypt, the evil eye, and a few others. But there is no attempt to trace the development of ophthalmology as a special branch of medicine.

The illustrations add greatly to the value and interest of the work. Their subjects vary widely as the Code of Hammurabi, Chinese acupuncture diagrams, four photographs of the statues of Asklepios and Hygieia, the landscapes showing the layout of Epidarus and the Asklepieion at Cos, the bust of Hippocrates and the earliest known manuscript of his works. There are portraits of leaders in medicine from Avicenna to Lord Lister, title pages and other pages of famous books, Vesalius' pictures of anatomy, Harvey's illustrations of his experiments, the "hand of Sarah Nelmes inoculated with smallpox," and Robert Koch in

his laboratory. Many of these pictures occupy full pages; and they give a reality and vividness to the narrative that could otherwise be attained only by wide travel and years of study.

The student of the classics traces in the past the roots of our life of to-day. The scientist lays bare the eternal relations of orderly sequence, of cause and effect. Combining the two services, Osler has left in this volume a tribute to the memory of her for whom the Silliman foundation was named, a monument of his own wide culture and untiring industry, and an inspiration to his heirs and successors in medicine to travel the paths of unselfish service and bring forth permanent benefits to the race. E. J.

BIOGRAPHIC SKETCHES.

THOMAS H. SHASTID.

SUPERIOR, WISCONSIN.

GUSTAVUS ADOLPHUS ASCHMAN, of Wheeling, W. Va., died of chronic nephritis and uremia on Oct. 2, 1921. He was born in New York City in 1860, his parents being of Swiss descent. His father died while he was very young, and his mother took him to Switzerland to be educated. He received his medical degree at the University of Zurich, Switzerland, in 1884, and shortly afterward migrated to America. Settling at Wheeling, W. Va., he established an excellent practice. At the time of his death he was consulting ophthalmologist to the Ohio Valley General Hospital, at Wheeling. He was medium sized, but erect and fine looking. He always took a deep interest in public affairs, and many times addressed various civic bodies and fraternal organizations of Wheeling on public questions. In 1889 he was married to Miss Ida Harden, of Wheeling.

HEMAN HAMPTON BROWN, a well known ophthalmologist of Chicago, died at Orlando, Fla., on April 10, 1921. He was born at Williamsport, Penna., July 8, 1863, son of George R. and Elizabeth Brown. His medical degree was received at the University of Michigan, Ann Arbor, in 1886. He was formerly professor of ophthalmology in the Illinois Medical College, as well as president of that institution. He was also professor of ophthalmology in the Chicago Eye, Ear, Nose and Throat College, and consulting ophthalmologist to the Columbus Hospital. He was active in the Chicago Ophthalmological Society, and served as its President.

Dr. Brown married, Nov. 17, 1886, Miss Myrtie L. Poucher. To the union was born one child, now Mrs. Ernest Salmon. The Doctor was a man of medium size, with florid complexion, blue eyes and white hair. He was always gay and brisk in manner, a voluminous reader, a collector of rare books. He was public spirited and progressive.

JUSTIN LOWE JACKSON, a prominent ophthalmologist and otolaryngologist of Savannah, Ga., died on August 11, 1921, at a hospital in that city. He was born in 1875, received the degree of A.B. at Emory College, and, in 1902, the M.D. from the Atlanta Medical College. He served in Grady Hospital, Atlanta, and in St. Joseph's Hospital, Savannah, and after practicing general medicine for two years, took a course on ophthalmology and otolaryngology in New York. Since then he has practiced eye, ear, nose and throat diseases in Savannah. He was once president of the Georgia Medical Society.

WALTER LYTLE PYLE. The death of the distinguished Walter Lytle Pyle at Merion, Penna., on Oct. 8, 1921, came as a profound shock to American ophthalmologists. He was born, son of William J. and Sarah Lane Thomas, Pyle, at Philadelphia, on Dec. 20, 1871. Three degrees were received by him from the University of Pennsylvania: the A.B. in 1888, the honorary A.M. in 1893, and the M.D. in the last named year. Before engaging in practice, Dr. Pyle specialized on ophthalmology, studying at Washington, London, and Paris. Returning, he practiced ophthalmology in Philadelphia until his death.

He was, for a time, clinical assistant at the Polyclinic, also clinical assistant, later assistant surgeon, to the Wills Eye Hospital. At the time of his death, and for some years prior thereto, he was ophthalmic surgeon to the Mount Sinai Hospital. He was a member of the College of Physicians of Philadelphia, of the Pennsylvania State Medical Society (sometime Assistant Secretary), a fellow of the American Academy of Medicine (sometime Assistant Secretary), a member of the American Medical Association (active in the Section on Ophthalmology), and a member of the American Ophthalmological Society.

In 1898 he was editor of "The International Medical Magazine"; from 1902-05 editor Department of Ophthalmology of "American Medicine"; from 1903-05 editor Section on Ophthalmology, "American Year-Book of Medicine and Surgery." He was also editor, as well as part author, of the well known "International Series of Hand-Books on Ophthalmic Practice," published by P. Blakiston's Son & Co., and still incomplete. The Doctor established a very large practice, and was widely known as an operator, more widely still, however, as a writer both on diseases of the eye and on medicine generally. All his writings bear the impress of deep sincerity and untiring scholarship.

Walter Lytle Pyle, 1871-1921.

Dr. Pyle was a large, stout man, smooth faced, of an olive complexion, brown eyes and black hair. He was always brisk, cheerful, friendly, and, as an old time acquaintance of his expresses it, "exuded vitality at every pore." He was a Member of the Sons of the Revolution, of the Union League and of the Medical and Art Clubs, and the Merion Cricket Club. On April 11, 1898, he married Miss Adelaide Besson, by whom he had two children, Sarah Adelaide and Walter Lytle.

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ABSTRACTS,

Wernicke, O. New Theory of Keratoconus—La Semana Medica, no. 24, 1921.

The etiology of keratoconus is entirely unknown, due primarily to the rarity of pathologic examinations and the monosymptomatic character of the disease, which is confined to one tissue—the cornea. Keratoconus being generally binocular is most probably due to a general diseased condition of the connective tissue, which is not confined to the eye, but may extend to other regions. We do not recognize these lesions because they produce small foci; and only when the connective tissue performs a delicate function, as in the cornea, are we able to visualize its effects.

Changes in the connective tissue of the whole body have been detected in different processes. What is known as "blue sclera," otosclerosis, the lack of resistance to fractures, luxations, etc., are primarily due to lack of resistance of this tissue.

There is a disease of the nervous system: multiple sclerosis, in which the changes are localized in the beginning, in the glia tissue, which altho different from the connective tissue, plays in regard to the nervous structures the same supporting role as the former.

The author believes that keratoconus represents only a plaque of sclerosis occurring in the cornea, and possibly existing also undetected in other parts of the body. Both conditions have in common the presence of pigment in the periphery of the cornea. The pigmentation of this membrane in patients suffering from multiple sclerosis has been described by Kyser in 1902, and later by Fleischer and others. In keratoconus a ring of pigment appears in the periphery and is considered by some authors as diagnostic of this condition.

Multiple sclerosis is due to a spirochete which it would be necessary to look for in the corneal tissue in order to corroborate the theory. This

spirochete is different from the one found in syphilitic tissues.

M. U. T.

Goldschmidt, M. Contribution to the Pharmacology of Optochin. Graefe's, Arch. f. Ophthal. 105 Band, Festschrift fuer E. Fuchs, p. 456.

Goldschmidt recalls a former communication, in which he showed that in the treatment of ulcus serpens with optochin hydrochlorid the rapidity of the diffusion of the latter thru the cornea must be considered.

He also calls attention to the retarding action of optochin, which in certain concentrations has a reversible action. He made a number of experiments on guinea pigs, which prove that solutions of optochin of 1.25 to 0.08% have a distinct retarding action on the regeneration of the epithelium, while concentrations of 0.04 to 0.01% are practically without influence on the process of regeneration. His experiment with the 1.25 to 0.63% solutions on the cornea of the guinea pigs also showed, besides retardation of regeneration, injurious effects upon the epithelium and parenchyma. Further examination on the resorbtion of hypopyon proved to his satisfaction that this is a process of autolysis. Solutions of optochin of 2 to 0.4% strongly retard, while solutions of 0.25 to 0.13% accelerate the autolysis.

This paradoxic action of optochin is well known in the case of quinin, and corresponds to the well known biologic law that solutions, which in certain concentrations retard an action, will accelerate the action when much diluted.

H. A.

Kooy, J. M. Prowazek and Other Forms of Cell Inclusions in Trachoma Patients. Doctorate Thesis, 1919. Amsterdam.

Johanna Marie Kooy gives a detailed description of the different forms of cell inclusions, which have been found since Prowazek and Halberstaedter published their findings in 1907. She also tried to cultivate some microorganisms. Seventy cases are reported in abstract, and she comes to the following conclusions:

It was possible in nearly all cases (69 out of 70) to make the diagnosis of trachoma from the slide of conjunctival secretion and epithelial cells, by demonstrating the different forms of a polymorphous microorganism. The clinical course was in agreement with this diagnosis. Intensive treatment, as with 2% silver nitrat, 2% ichtargan, and pressing out the follicles made some forms of the microorganisms disappear quickly, namely the larger intracellular initial forms. The intracellular elementary bodies were the most obstinate to treatment. Trachoma in the cicatricial stage could still be dangerous with such forms present.

The different forms were variously present in patients from different parts of the city. A polymorphous microorganism could be cultivated from five cases, which would produce all forms as found in the slides. One could even observe that one form produced the other. The forms had similarity with those described in scarlet fever, variola, vaccinia and jaundice of the silk worm. The microorganism is facultatively anaerobic, grows very slowly. Growth was demonstrated by transinoculation with the solid ascites medium, on which the microorganism appeared two to seven days later. As a rule it is not resistant to 10% taurocholic acid. It closely resembles that described by Noguchi and Cohen in 1915. It is resistant against drying during half an hour at 32 degrees, and heating during one hour at 45 degrees in ascites fluid. It is killed by heating at 50 degrees.

E. E. B.

Bonnefon. Circulation in Choroid and Ciliary Body in Relation to Ophthalmotonus and Secretion of Aqueous. Ann. d'Ocul. v. 157, p. 504.

The facts quoted seem to prove that the choroid, instead of being an erectile or turgescent tissue, is in reality a venous reservoir with a very sluggish circulation. The vortex veins are

usually compressed by the intraocular tension, which their internal pressure cannot overcome. The capillary tension of about 60 mm. is almost completely absorbed by the choroidal plexus, for the pressure in the efferent veins is only 8 mm.

The tensor muscle of the choroid fastens the choroid to the vitreous body, and thus removes, partially, the superficial layers from the action of the intraocular tension, when it contracts. The ciliary contractility, whose normal play implies the perfect elasticity of the ocular membranes, is the dynamic agent of the choroidal circulation. When the muscle acts, the venae vorticosae dilate, resulting in an afflux of blood which empties thru the perforating veins. To this corresponds a delay in the ciliary circulation due to the profuse anastomosis. The vortex veins thus act as valves, maintaining a constant pressure in the ciliary body, and influencing thereby the formation of the aqueous by the latter.

C. L.

Leplat, G. Arterial Pressure in Vessels of Iris. Its Modification Under Collyria. Ann. d'Ocul. v. 157, p. 693-701.

The arteries in the iris of the dog are visible to the naked eye, and under weak magnification the amplitude of their pulsation can be noticed. They are therefore well adapted for the solution of the above problem. The author found that there was an arterial pulsation in the presence of the normal ocular tension. This pulsation is increased under the influence of a weight of 30 to 45 on the dynamometer, but is abolished when the weight reaches 75 to 90. This, however, is only temporary, and to abolish it permanently, a weight of 100 to 115 is necessary. Testing with collyria, it was found that atropin distinctly increased the tension in the iridal arteries, and that cocain has a similar effect, tho less pronounced. Pilocarpin and eserin act as vasoconstrictors, producing a secondary arterial hypertension. Altho the ocular tension falls, there is only a slight variation in the arterial tension. Dionin (2.5%) had no influence on either arterial or ocular tension. Adrenalin increases both ophthalmotonus and arterial tension, the latter to a much greater degree.

C. L.

Behr, C. Hereditary Degeneration of Macula. Klin. M. f. Augenh. v. 65, p. 465.

The degeneration of the macula may also appear as a decidedly hereditary disease of typical aspect, characterized by the following qualities: 1. The disease is a family affection or hereditary. 2. The changes are almost always bilateral and of great similarity in both eyes. 3. Certain family types exist which recur in the affected members in almost photographic identity. The family type is characterized by the onset and the course of the affection. Usually it begins in the border years of the different periods of growth: as congenital affection at the transition of the intrauterine to extrauterine life; from the 6th to 8th years, at the commencement of the 2nd dentition; around the 14th year at the beginning of sexual maturity; in the early twenties at the completion of growth of the skeleton and sexual maturity; around the 50th year, the beginning of senile involution, and finally senilism, (Behr considers the senile macula degeneration of Haab identical with the heredodegeneration), as premature sign of approaching death. Most cases belong to the infantile and juvenile types.

The affection is either slowly progressive, without leading to complete amaurosis as long as there are no complications, or is spontaneously arrested after some time. In these cases the functional disturbances (diminished central vision, small relative scotomas) may improve. The time of occurrence and character of course in each family are always exactly alike. The heredodegeneration of the macula occurs either in different children of the same family without affected ascendency as collateral latent hereditary transmission, or directly or indirectly from one

generation to the following. The transmitting women as a rule are themselves affected, whereas the transmitting men have been intact. It often is combined with other hereditary diseases of the nervous optical apparatus. Those complications are not subject to the rigid hereditary law of degeneration of the macula. There is no family type as the complications may affect only some members, or are not homogeneous disturbances of the color sense (red-green weakness, Daltonism, Daltonism with participation of the yellow-blue sensation, and total color blindness are the most frequent). In others partial or total optic atrophy, a disease similar to retinitis pigmentosa, and honeycombed chodoiditis of the extramacular retina are encountered. All these have nothing to do with the heredodegeneration, and are independent parallel hereditary complications indicating a great extension of degeneration tendency of the parental germ plasm. But not every degeneration combined with heredodegeneration of the macula is hereditary.

Behr reports the clinical histories of a number of families, illustrating the different types. Ophthalmoscopically the focus has the shape of a disc or a horizontal oval of rather sharp outlines, surrounded by a concentric zone of more intensive pigmentation. It has the size of from 1/2 to 1 disc diameters, in one case 5, is of yellowish brownish red color, not uniform, but spotted and contains dots or lumps of pigment, sometimes glistening white dots. The fovealar reflex disappears early, the macular reflex may be preserved for a long time. In one case the focus looked very like a coloboma.

C. Z.

LeBoucq. Circulation in the Aqueous Humor. Royal Academy of Belgium. Oct. 30, 1921.

In a new work on the circulation of ocular fluids, le Boucq seeks to demonstrate the existence of a current in the anterior chamber. He has studied the composition of the aqueous humor and the conditions of its formation, and he points out the changes in it following inflammation. He finds a preeminent proof for the existence of a liquid current in the ease with which the composition of the aqueous humor varies. Le Boucq refers to injections or fluorescin and their appearance in the anterior chamber, following ligature of the lymph duct of the neck in a rabbit. This resulted in myosis of the ligated side; and the appearance of the fluorescin was more diffuse on the side not ligated. Le Boucq thinks that circulation of the aqueous humor is controlled by the sympathetic.

M. Danis.

Holland. Eye Operations Performed at Shikarpur, Sind, in Jan. and Feb., 1921. *Indian Medical Gazette*, Vol. LVI, p. 212, June, 1921.

This is the eleventh year Dr. Holland has visited Shikarpur and the figures show the same huge amount of work as in previous years. On 29 operating days, 2412 eye operations (besides 185 general operations) were performed.

The chief operations were cataract 1203, iridectomy 253, pterygium 117, entropion and trichiasis 296, evisceration 25, excision of lacrimal sac 6, probing 23.

Ninety-five per cent of the cataracts were expressed in the capsule, capsulotomy being done "in all cases in which the lens does not present well," in traumatic and congenital cataracts, and in some cases of high tension. In the 1203 cases were nine cases of sepsis, 0.75%, and eight cases of choroidal hemorrhage, probably from high tension. It would have been interesting to know the methods adopted for the prevention of sepsis.

After results of trephinings and Herbert's operations, done in previous years, were seen and found satisfactory. Where iridectomy had been done in one eye and trephining in the other, the latter showed the better result.

Subjunctival injections of saline were made in 193 cases of pannus, 59 of trachoma and 52 of recent corneal opacity and corneal ulcers. In phylctenular ulcers they acted like a charm, also in superficial leucomata of not

more than three months duration. Dr. Holland has given up using cyanid of mercury injections as being much more painful and no more successful. The strength of the saline injected is not stated. Trachoma was also treated —in mild cases—by the application of 1 in 100 corrosive sublimat. Severe cases were scraped by a sharp spoon before the application.

The staff was small. It included six doctors in all, never more than three at once. Among them was Dr. Martin of the American Presbyterian Mission. F. P. M.

Rush, Calvin C. Treatment of Trachoma. China Medical Journal, vol. xxxv, no. 3, May, 1921, p. 211.

Rush emphasizes the difficulty of recognizing the early stages of trachoma, "the foremost cause of blindness in China," from simple folliculosis or follicular conjunctivitis. He thinks it possible that conjunctival granulations may be the result of "too much sun," since many of the Chinese wear no hats at all. "The sunlight, by keeping the eyelids in a state of chronic irritation, probably makes the conjunctiva more susceptible to the trachoma infection. This gives the first indication for treatment—that a hat with a good brim be worn."

Rush generally uses the copper sulphat stick, especially in pannus cases, until the granules are no longer visible, and then uses daily glycerit of boroglycerin, which he says should be made strictly in accord with the directions of the pharmacopeia.

For a change of treatment he suggests rubbing the diseased lids with applicators dipped first in $HgCl_2$ (1-500) and then in powdered boric acid.

In corneal involvement, atropin and yellow oxid of mercury ointment are used. In cases of purulent discharge he applies silver nitrat 2% sol., or argyrol 25% sol., which should be made up freshly each week. In certain cases expression of the follicles gives splendid results.

For home treatment he relies upon zinc sulphat, boric acid and normal salt solutions. H. J. H.

Denhaene. Ocular Lesions Caused by Asphyxiating Gases. Congres Internat. de Med. Milit. July 15, 1921.

In spite of the pessimist previsions at the beginning of their use, the war gases have provoked but slight ocular lesions compared with the damage caused to other organs.

The ocular lesions are generally limited to some light specks on the cornea and even these are rare, according to the majority of authors. We must accept only with reserve the assertion of those who impute to the poison gases the ocular lesions of which they avail themselves in order to obtain a disablement pension.

Without rejecting absolutely the possibility of incurable chorioretinal lesions, the action of the vesicant gases on the posterior segment of the eyeball is limited to a venous congestion of the deep membranes, and yet the latter is met with only in the severe poisonings of the whole organism.

As regards the blepharoconjunctivitis, secondary to the gas injuries, this is curable by an adequate and more or less long treatment, and consequently does not entitle to a percentage of disablement. M. D.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville, Tenn. Volunteers are needed in other localities.

DEATHS.

Dr. E. R. Schneider, a well known Danish ophthalmologist, died recently.

Mrs. Greenwood, wife of Dr. Allen Greenwood, of Boston, died very suddenly on September 26th, 1921.

Dr. William H. Fox, Washington, D. C., aged sixty-four, died November third. He was a member of the American Ophthalmological Society and a former surgeon to the Episcopal Eye and Ear Hospital.

Dr. F. P. Maynard, lieutenant-colonel, Bengal Medical Service, retired; former professor of ophthalmology, Medical College of Calcutta, India, died from pneumonia, September 20th, at his home in England.

PERSONALS.

Dr. Myles Standish, of Boston, has resumed practice after a month's indisposition.

Dr. L. Webster Fox spent the Christmas holidays at Port Sewell, Florida.

Dr. Ruth Alexander has opened an office in the Alexander Young Building, Honolulu, and limited her practice to eye, ear, nose and throat.

Drs. L. E. Brown and T. H. Cook of Akron, Ohio, have taken offices in the Second National Bank Building.

Dr. Alexander Duane, of New York City, delivered an address on "The Hour of Vision," before the University Club, of Baltimore, October 21, 1921.

Dr. John M. Wheeler has been elected Chairman of the Section of Ophthalmology of the New York Academy of Medicine, and Dr. Ben Witt Key, Secretary.

Dr. W. B. Banister, brother of Dr. John M. Banister of Omaha, Nebraska, is spending a few days in Honolulu on his journey from Manila to the States.

Walter H. Kiep has been appointed professor of ophthalmology in the Cairo Medical College, with charge of the ophthalmologic clinic at Kasr-el-Ainy Hospital.

At the Centenary Reunion of McGill University, held in Montreal last October, two ophthalmologists were given the degree of L.L.D. They were Mr. J. B. Lawford of London, England, and Dr. Casey A. Wood of Chicago.

Dr. Hans Barkan spent the Christmas holidays with his father, Dr. A. Barkan, of Switzerland, formerly of San Francisco. Dr. Barkan will spend several months in the clinical centers of Europe before returning to San Francisco.

Mr. Lewis H. Carris, Washington, D. C., who has been engaged in government vocational educational work, has been appointed field secretary for the National Committee for the Prevention of Blindness.

Professor Fuchs, of Vienna, gave a course in Boston, arrangements for which were made by the New England Ophthalmological Society. The men who attended found the course most interesting and instructive.

At the November meeting of the New England Ophthalmological Society Dr. Snell, of Rochester, New York, gave the substance of the report of the A. M. A. Committee on "Compensation for Ocular Injuries."

Dr. Harold Gifford and Dr. Casey Wood are visiting British Guiana again this winter, and will journey into the interior to see the Kaietur Falls. The latter has been in Barbados collecting material for a proposed work on the Eyes and Eyesight of Birds. Dr. Wood has been recently elected a Life Member of the American Ornithologists' Union.

On November 4th, 1921, Dr. Van Der Hoeve, of Leiden, Holland, gave a most interesting illustrated talk on "The Optic Nerve and Sinus Diseases" before the New England Ophthalmological Society and the New England Otological and Laryngological Society.

Dr. Gilbert E. Seaman has purchased the three story residence, corner Mason and Cass Streets, Milwaukee, and will convert the building into offices and an infirmary of twenty beds for eye, ear, nose and throat cases. Dr. Seaman has associated with him Dr. Thomas Tolan, recently of the University of Michigan.

Dr. George H. Kress, of Los Angeles, called on us, in Denver, a few days ago, on his way home from a nine months' trip to Vienna. He will write something for publication very shortly, giving us the benefit of his experiences there. It appears that the clustering together of the Vienna clinics is a distinct advantage when compared with the scattered clinics which obtain in almost every other city in the world.

SOCIETIES.

The January meeting of the Kansas City Eye, Ear, Nose and Throat Society was held in St. Joseph, Missouri.

The next meeting of the Academy of Ophthalmology and Oto-Laryngology will be held September 19-23, at Minneapolis. The Academy will be entertained by the Minneapolis Academy of Ophthalmology and Oto-Laryngology, and the meetings will be held on the campus of the University of Minnesota.

At the annual election of the Louisville Eye and Ear Society on December 9th, the following officers were elected for the ensuing year: President, Dr. George Robertson; vice-president, Dr. J. H. Simpson; secretary and treasurer, Dr. Gaylord Hall. Dr. Max A. Goldstein, of St. Louis, was the guest of the Society in January.

At the January meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia, Dr. Hiram Woods, of Baltimore, by invitation read a paper on "Impressions from Eye Examinations in Real or Supposed Psycho-Neurotics." This paper was discussed by Dr. G. E. de Schweinitz, Dr. F. X. Dercum, Dr. A. C. Buckley, and others.

MISCELLANEOUS.

Cornell University Medical College is to open a model pay clinic. It will hold clinics daily and two evenings each week. The fees will be one dollar for each visit and examination. Dr. Lewis Gregory Cole is to have charge of the opthalmologic clinic.

The Council of British Ophthalmologists has rendered the opinion that the medical service of the police force and that of the postal service, cannot be adequate unless it includes the services of ophthalmic surgeons to whom recruits and employés can be referred for expert opinion.

An arrangement has been perfected by the American Academy of Ophthalmology and Oto-Laryngology with the Army Medical Museum, whereby the latter is to set apart space for the display of specimens, and to coöperate by reports to donors of specimens with photographs of gross specimens and microscopic slides. All ophthalmologists are urged to send specimens for this collection. They will be available for study by physicians, and the Museum will prepare a pathologic exhibit for each meeting of the Academy. Specimens should be sent in wide mouthed bottles. First a layer of cotton in bottom of bottle, then the specimen, then more cotton, when the bottle is filled with a 10 percent solution of formaldehyd and allowed to stand twenty-four hours. The fluid is then drained off, the bottle tightly corked and mailed to the Section on Ophthalmologic and Oto-Laryngologic Pathology of the Army Medical Museum, Washington, D. C. A clinical record of the case should accompany the specimen. The Committee is preparing a file of lantern slides, charts, moving pictures, etc., used in the courses given by the Academy, and this material will be used by members for teaching purposes. The committee in charge consists of Major George C. Callender, Washington, D. C., and Drs. Harry Gradle and Ira Frank, Chicago.

Mr. William A. Hadley, of Winnetka, a suburb of Chicago, was a High School teacher for sixteen years, until he lost his sight six years ago, and was forced to retire on a modest income. He conceived the idea of teaching the blind by correspondence. At the present time he has nearly ninety blind students, scattered from Shanghai to Boston, with whom he corresponds, correcting their papers, giving them their new lessons with the aid of a Braille typewriter. The citizens of the town recently gave an entertainment for the purpose of raising funds to purchase a printing press, for paying the wages of a stenographer, and for securing additional equipment for his magnificent work.

Investigations which have been in progress in regard to trachoma conditions in Southern Illinois, reveal the startling fact that in one county, during a period of ten years, one out of every three families sent a charity patient suffering from trachoma a journey of 200 miles for treatment at the Illinois Charitable Eye and Ear Infirmary in Chicago. In another county one-eleventh of the entire county budget has been used for pensions for the blind, two-thirds of whom are blind from trachoma.

It is an interesting fact that the foreigners in these mining sections of the state have much less trachoma than the native American population. In one town of 11,000, 40 percent are foreign. Examination of the eyes of all the school children of this town revealed the fact that 92 percent of the trachoma cases were children of American born parents.

Current Literature

These are the titles of papers bearing on ophthalmology received in the last three months. Later most of them will be noticed under Digest of the Literature. They are given ni English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrations; (Pl) plates; (Col. Pl.) colored plates. Abst shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention copies of papers or reprints should be sent to 318 Majestic Building, Denver, Colorado.

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Angeluccia, A. Positive origin of the esthetic sense. (10 ill.) Arch. di Ottal., 1921, v. 28, pp. 49-84.

Berger, E. Importance of psychical inhibition (neutralization) in binocular single vision. Brit. Jour. Ophth., 1922, v. 6, pp. 22-24.

Erggelet, H. Space perception with changes in ocular base line. Vienna Cong. Aug., 1921. Zeit. f. Augenh., 1921, v. 46, p. 301.

Greeff, R. Optics of Bernstein lenses. (Bibl.) Arch. f. Augenh., 1921, v. 89, pp. 145-155.

Koellner, H. Tactile localization of visual direction in relation to projection of double images. (8 ill.) Arch. f. Augenh., 1921, v. 89, pp. 121-136.

Passow, A. Photometry of ultraviolet lights. (2 pl.) Arch. f. Augenh., 1921, v. 90, pp. 123-126.

Sachs, M. Portrait and actuality. Wein. med. Woch., 1921, No. 24, p. 1079.

Schanz, F. Vision, Effects of Light. Vienna Congress, Aug., 1921. Zeit. f. Augenh., 1921, v. 46, p. 236.

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Cantonnet, A. Use of red free light in ophthalmoscopy. Soc. d'Opht. de Paris, Oct., 1921. Ann. d'Ocul., 1921, v. 58, p. 841.

James, J. H. Headaches from eyestrain. Ewing's sign in diagnosis. Med. Rev. of Rev., 1921, v. 27, pp. 579-581.

Koeppe, L. Slit lamp observations in Spain. Zeit. f. Augenh., 1921, v. 46, pp. 273-285.

Marin Amat, M. Microscopy of living eye after Koeppe. Rev. Cubana de Oft., 1921, v. 3, pp. 479-513.

Purtscher, A., and **Guist, G.** Microarc lamp for scleral transillumination. Vienna Cong., Aug., 1921. Zeit. f. Augenh., 1921, v. 46, p. 230.

Santos Fernandez, J. Rainbow vision without glaucoma. Rev. Cubana de Oft., 1921, v. 3, pp. 354-356.

Schueller, X-ray observations with visual disturbances. Vienna Cong., Aug., 1921. Zeit. f. Augenh., 1921, v. 46, p. 302.

Wieden, E. Microscopy of living eye. España Oft., 1921, v. 6, pp, 141-151.

OPERATIONS.

Gradle, H. S. Anesthetic for ophthalmic use. Western Med. Rev., 1921, v. 26, p. 586.

Ramsay, A. M. Operating hand lamp for ophthalmic work. (1 ill.) Lancet, Dec. 17, 1921, p. 1282.

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Darier, A. Milk injections. (Bibl.) Clin. Opht., 1921, v. 25, pp. 607-614.

Dimitry, T. J. Chromium in ocular therapeutics. Med. Standard, Jan., 1922.

Fuchs, A Subconjunctival injections. Wien. med. Woch., 1921, No. 24, p. 1051.

Guist, G. Reaction of light and dark irides to homatropin and atropin. Wien. med. Woch., 1921, No. 24, p. 1055.

Loehlein. Anilin as a therapeutic agent. Ther. Halbm., Sept. 15, 1921. Ab. Clin. Opht., 1921, v. 25, p. 560.

Pfluegk, v. Treatment of ocular inflammation with staphar (staphylococcus vaccine). Vienna Cong., Aug., 1921. Zeit. f. Augen., 1921, v. 46, p. 229.

Steen, v. Modern eye treatment. Woch. f. Therap. u. Hyg. d. Auges, 1920, v. 23, p. 93.

Stumpf, P. Technic and results of radiotherapy in ophthalmology. Arch. f. Augenh., 1921, v. 90, pp. 108-122.

Vialleton. Saccharin methylen blue subconjunctival injections. Clin. Opht., 1921, v. 25, pp. 557-560.

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Demole, V. Total ophthalmoplegia interna in lethargic encephalitis. Arch. d'Opht., 1921, v. 38, p. 754.

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Pacalin, G. Erect image in fundus in refraction. (13 ill.) Arch. d'Opht., 1921, v. 38, pp. 601-627.

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Kollner and Hoffmann. Influence of vestibular apparatus on motor stimuli of eye muscles. Vienna Cong., Aug., 1921. Zeit. f. Augenh., 1921, v. 46, 293.

Marin Amat, M. Ophthalmoplegic migrain. (3 ill.) Rev. Cubana de Oft., 1921, v. 3, pp. 293-402. Abst. J. A. M. A., v. 77, 1921, p. 2096.

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Ribas Valero. Localization of images in physiologic binocular diplopia. Arch. de Oft. Hisp.-Amer., 1921, v. 21, pp. 517-533.

Santos Fernandez, J. Traumatic paralysis of ocular muscles. (1 ill.) Rev. Cubana de Oft., 1921, v. 3, pp. 348-354.

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Terrien, F. Chronic Progressive External Ophthalmoplegia. Presse Méd., 1921, p. 937.

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Brana, J. Treatment of trachoma. Vienna Cong., Aug., 1921. Zeit. f. Augenh., 1921, v. 46, p. 299.

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